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SCIENCE AND TECHNOLOGY

No. 58

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SEVERAL SUGGESTIONS ON BUILDING A SCIENTIFIC, TECHNOLOGICAL BASE

Tianjin TIANJIN RIBAO in Chinese 23 Jul 80 p 2

[Article by Pan Yusheng [3382 7183 3932] of the Tianjin Municipal Institute of Petrochemical Industry]

[Text] I. Tianjin needs to plan to build a "scientific education center" (or "satellite city for scientific education"). During the 24 years I was in Beijing, I saw the completion and development of "Zhongguan Cun" (the site of the Academy of Sciences), a scientific education center in Beijing. I am deeply impressed and appreciate the role it has played in promoting the development of scientific education of Beijing and academic exchange at home and with other countries. Most of the important institutes of the Chinese Academy of Sciences are there, plus neighboring Qinghua University, Beijing University and the Scientific and Technological Library of the Academy of Sciences. Our former unit was located close to Zhongguan Cun, and we had easy access to each other's equipment, academic activities and scientific literature and information. It was very convenient for us to seek advice from specialists on difficult problems and learn about new scientific findings and accomplishments. After returning to Tianjin, I found the situation completely different. Scattered far and wide all over town, the research institutes are so independent and isolated that contact is very difficult. For instance, the institute where I work, the Tianjin Municipal Institute of Petrochemical Industry, is located at the Chenglin-zhuang Industrial Zone in the eastern suburbs of the city, and there is no other institute nearby. Because it is newly established, we often need to contact outside sources for help. Each time we go to the municipal people's library to check references or to the Science Auditorium for academic events, we have to spend more than 2 1/2 hours for the round trip. It is even more difficult to contact other fraternal institutes. Since scientific research depends on exchange and cooperation, we suggest that a "scientific education center" be included in the overall city plan of Tianjin. In my opinion the area near the waterfront park is worth considering. Peaceful and quiet, the locality has enough room for growth, is not too far from the center of the city and is close to important higher educational institutes such as Nankai University and Tianjin University.

II. The Municipal Science Committee should be in charge of "the scientific and technological information center," a "center for unified coordination and management of scientific research institutes," an "analysis and testing center," and a "scientific supply and service center." Generally speaking, the scientific research institutes in Tianjin are rather weak compared with those in Beijing, and therefore require unified management, cooperation and efficient research support. The municipal people's library could be a starting point for the "information center," which would organize the city's various scientific disciplines and information workers into a united, city-wide scientific and technical information network. A "scientific and technological information search center" and a Tianjin scientific and technological library" for the whole city would be established at the future "scientific education center." The main functions of the "management center" are to consult the various bureaus to organize, deploy, coordinate and inspect implementation of key city-wide research projects and to organize facilities to assess, check, accept, report to the higher authorities and to popularize research achievements. The "analysis and testing center" is a research institute charged with the exclusive responsibility to introduce, selectively test and put to use imported large advanced analysis instruments. The advantage of this arrangement is that it provides a way to use Tianjin's foreign exchange in an integrated manner--based on investigation and research--should the various units be short of foreign exchange, in order to import world-class large-scale modern physical analysis instruments such as color spectra--mass spectra [computers], "Laser Raman spectrometers," etc. A single research institute usually does not have enough foreign exchange to import these large instruments and has inadequate technological capability; the instruments have a low utilization rate. When "the center" imports them, it has specialists to test, oversee, maintain, repair and use them. Units can entrust it with running them for greatly enhanced efficiency. The "service center" may use a "Tianjin Scientific Instrument Company" as a base to expand its service coverage to all the institutes to unify and coordinate planning, supply and demand, and distribution of the scientific instruments. It may also adjust the surplusses and deficiencies of the institutes to meet their urgent needs.

III. Further enlarge and improve academic exchange activities: Today, even though there are many academic societies and their branches in Tianjin, academic activities still trail behind those in Beijing. Take analytical chemistry for example. In view of the fast development of liquid chromatography, Beijing organized a seminar on liquid chromatography 2 years ago. Specialists from all the institutes gathered and agreed on the series to be given by them individually for half a day each week, plus discussions of related subjects, tours and exchanges of information. The course lasted several months and all those who participated found it quite rewarding. This year, Tianjin started to give a simple introduction to liquid chromatography, but academic activities still trail scientific research needs. Actually, Tianjin has its own specialities. The chromatographic reagents and fixing agents of the Second Reagent Plant are well known throughout China. There is another good tradition in Beijing: information is "circulated" by the import and export companies about importation of any new and large instruments by any institute where foreign technicians come to install, test and discuss them to all fraternal units very quickly. This enables their specialists in the field to avail themselves of the opportunity to attend the sessions. I sincerely hope that our city follows this good example to organize academic seminars, promote exchange of scientific information and encourage discussions and cooperation. This is a vital link in speeding up the establishment of a "scientific and technological base" in our city.

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BRIEFS

JIANGSU EARTHQUAKE RUMORS--There have been rumors recently about an imminent earthquake in Jiangsu. In this connection, a responsible comrade of the Jiangsu Provincial Seismological Bureau said that the bureau had so far monitored no sign of an imminent destructive earthquake in the province. He pointed out that the information about earthquakes carried recently in newspapers and over broadcasts was aimed solely at disseminating such information to the masses so that they would be able to minimize losses if an earthquake occurred. He added that research in earthquake forecasting, whether in China or abroad, was still in the exploratory stage, and that the report that a foreign country had forecast an imminent destructive earthquake in Jiangsu was entirely groundless. [OW041709 Nanjing Jiangsu Provincial Service in Mandarin 2300 GMT 2 Sep 80 OW]

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APPLIED SCIENCES

COMPUTER OUTLOOK: STRESS ON BUYING TECHNOLOGY, NOT MACHINE

Beijing GUANGMING RIBAO in Chinese 1 Aug 80 p 4

[Article by Ji Zong [4764 1350]: "Technical Policy Problems in Developing Our Country's Electronic Computer Industry"]

[Text] Beginning by summarizing the practical experience of over 20 years of China's electronic computer industry and giving specific considerations to the present actual situations in that industry, we put forth the following ideas on technical policy with the hope that they will attract the attention and joint study of all those involved.

1. Combine large, medium and small sizes, emphasize medium and small, vigorously develop microcumputers for wide applications

Since the realization of integrated circuits, today's electronic computers, with their greatly reduced bulk, reduced costs and improved reliability, have achieved the physical basis for broadened popular applications. Small and medium sized computers are among the most widely used today and constitute over 90 percent of all computers assembled. Mircrocomputers, which first appeared in the early 70's, are now widely used throughout society. Accumulated experience and personnel trained in microcomputers create more favorable conditions for the production and utilization of even more sophisticated computers. Naturally, the development of large computers is indispensable in carrying out China's four modernization. Thus, the interrelations of large, medium, small and micro computers, and their popularization and escalation, must be managed soundly.

2. Develop [serially manufactured] computers, achieve multiple use of the same machine and common use of many machines

Due to various reasons, the early development of China's electronic computer industry had gone astray by focusing its attention on single-machine systems and emphasizing singular technologies while neglecting the standardization, interchangeability and serialization of computers. Consequently, the compatibility of various machines and the continuation in production and application were very poor, and, as a result, what could have been a faster development in China's computer industry was impeded. Serialized computers have many distinct advantages; among various computers of the same generation, software of small machines can be run on large machines and software of large machines is an expanded version of small machine software. Software produced by users at the expense of great manpower will not be rendered useless upon the switch to a new machine. Serialized computers have successfully solved the continuation problems in production and application. They are therefore advantageous with regard to manufacture, broadened usage, centralized repair and maintenance, training of operators and maintenance personnel and speedy development of software.

3. Ensure adequate accessories, strengthen technical services

Computer systems encounter different demands in different applications. Facing the users, the computer industry needs to put great effort in developing various kinds of peripherals, especially intelligent terminals, to provide the users with complete computer services at various levels with sufficient accessories which come with the machine and adequate software, maintenance tools, spare parts and supplemental facilities. Since it takes people with special training to run the machines, application departments such as technical services divisions and software centers are established within the computer industry to aid the users through the training of operators and maintenance men, through the installation and repair of machines, application system designs and software development. The users can then concentrate their efforts on developing the applications in their fields without the need to keep skilled technical personnel and to be concerned with their operation and maintainees training.

4. Make efforts to improve the quality of computers made in China and continue to reduce costs.

Through better business organization and management, improved manufacturing technology and better product quality, we must provide the various organizations in China which are urgently in need of electronic computers with computer systems of higher quality and raise the competitiveness of Chinese-made computers. For this reason, we suggest importing a certain amount of the elements, parts and peripherals which are temporarily not available in China and those not up to standard in quality or economically unfeasible to produce in China. By doing so, we can raise the quality of Chinese-made computers and reduce their costs at a faster pace.

5. Introduce advanced foreign manufacturing technologies instead of blindly buying their machines.

In order to change the backward state of our computer industry and to reverse the situation of importing computers in large quantities, we must make great effort in reforming our country's computer industry and introduce the necessary manufacturing techniques and key production facilities. We must thoroughly change the wrong practice of the past when we were only buying the machine and not the technology.

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TITLE: "Development and Prospect of Space Electronics (I)"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 2-5

ABSTRACT: This paper sums up space electronics into the radio electronic technologies used in realization of tracking and controlling of satellites and space vehicles, in satellite observation of the earth, space probing, and satellite communication broadcasting, and in positioning moving objects on earth with satellites. Outstanding achievements of space electronics in recent years are discussed and the special characteristics of the field analyzed. The general condition of development of space electronics in China is briefly introduced, and finally future development in space electronics is briefly predicted.
This paper is a reprint from DIANZI XUEBAO No 2, 1980.

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TITLE: "Method of Reaslizing Modulation of Digital Echo-wave"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 6-10, 47

ABSTRACT: This paper analyzes the time-division characteristic of digital echo-wave signal sequence. Based upon this characteristic, a general method of designing the time-delay line and the limiter resistor of the digital echo-wave modulator is derived. When this method is adopted, the time-delay line and the limiter resistor may be made simpler and a satisfactory result may be obtained.

AUTHOR: HE Xiaoting [0149 1420 5312]

ORG: None

TITLE: "Mutual Interference of Microstrip Transmission Lines"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 11-16

ABSTRACT: This paper describes the phenomenon of mutual interference [cross-stalking] of microstrip transmission lines. The reasons for the occurrence of mutual interference are discussed. The various types of mutual interference are classified and defined, and the necessary analysis and computation of the quantity of interference given. Finally, measures for reducing mutual interference are suggested.

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TITLE: "Theory and Direction of Development of Encased Digital Magnetic Tapes"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 17-21

ABSTRACT: Encased digital magnetic tape evolves from the Philip cassette recording tape of the late 1960's. In the early stage, it was not very reliable, and there were frequent problems. In 1971-72, the digital cassette, i.e. the so-called cartridge magnetic tape machine, specially designed for the use of computers appeared. Today, both types of encased magnetic tape machines are being rapidly developed and extensively applied in peripheral equipment of microcomputers, terminals, digital communication, data gathering, instruments, and meters, etc.

AUTHOR: WU Hengxian [0702 1854 7359]
LIU Liren [0491 4539 0086]

ORG: Both of Shanghai Research Institute of Optics and Precision Instruments Chinese Academy of Sciences

TITLE: "Ion Injection Semiconductor Laser Annealing Device"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 22-24, 29

ABSTRACT: When damages occur to a semiconductor after ion injection, annealing process is needed to treat it to activate the injected impurity in the semiconductor and at the same time to restore the damaged crystal lattice of the semiconductor (silicon or gallium arsenate)so that the layer containing the impurity may have the desired electrical property. A method is needed to proceed with annealing of the injected layer under a room temperature, or slightly higher environment to cause the damage to the crystal to recover but to cause no damage to the underlining material. In the most recent years, there has been a great deal of research on the use of laser annealing for this purpose in the USA, USSR, etc. With the cooperation of Shanghai Institute of Metallurgy, the authors made a ruby laser (a neodymium glass laser may be used as a substitute) and carried out a successful laser annealing experiment on silicon injected Bi^+, B^+, gallium arsenate injected Sn^{119}, etc. Preliminary results of experiments on extension growth of semiconductor and ohm contact, etc. are also reported.

AUTHOR: XI Weide [1598 0251 1795]

ORG: None

TITLE: "Infrared Photoelectric Reversible Counter"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 25-27

ABSTRACT: In connection with fulfilling needs of scientific research projects, the author and colleagues made an infrared photoelectric reversible counter. It is a device of automatic detection and measurement using the theory of infrared technology to identify and count the direction and the quantity of the motion of a moving object. It is composed of the infrared detector, direction identification, and the reversible counter. The theory of the 3 components and their circuit diagrams are described.

AUTHOR: FAN Jianshun [5400 1696 7311]

ORG: None

TITLE: "Introducing a New Variable Electromagnetic Delay Component"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 33, 5

ABSTRACT: With the rapid development of electronic industry, occasions for the use of electromagnetic delay components are increasing and their requirements are becoming higher and higher. The ordinary variable delay components may be connected according to the traditional method, of course, but some common problems will occur. Based upon the experience of the author and his colleagues, this paper describes these common problems and 2 methods of improving them. Finally, if the use frequency is relatively high and requirement strict, the adoption of a fixed impedance micro-modulation delay component is recommended. It will, theoretically, overcome the above mentioned shortcomings. It is now being produced by Hangzhou Radio Component Plant, and is given the name of YT-250-0-50 fixed impedance micro-modulation delay component. Its major technical indices and a photo depicting its various parts are included.

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TITLE: "Introducing Chinese Make TTL Digital Integrated Circuit Series Products (VI)--Intermediate Scale Shift Storage Unit and Other Products"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 80 pp 44-47

ABSTRACT: The logic circuit diagrams, the work theory, the property characteristics, and the applications of 2 4-position shift storage units, T453 and T454, and 3 8-position shift units, T456, T458, and T457 are described, without mentioning the manufacturer. The log-2 logrithum converter made and designed by Shanghai Electronic Component Second Plant is briefly introduced. Silicon rectifier components of ZP, KP, KK types made by Beijing Chunshu Rectifier Plant and other rectifying equipment produced by this plant are briefly mentioned.

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CSO: 4009

AUTHOR: YIN Ming [1438 6900]

ORG: None

TITLE: "Remote Sensing"

SOURCE: Beijing DIANZI SHIJIE [ELECTRONIC WORLD] in Chinese No 8, 80 pp 2-4

ABSTRACT: Remote sensing is the use of instruments placed in space to monitor and measure the earth environment of the ground surface, the oceans, and the atmosphere. In 1972, the USA successfully launched an earth resources technology satellite and it brought back a large quantity of ground surface images of the entire world. Since then, more than 100 countries and regions are developing this activity of remote sensing. The use of electromagnetic wave to transmit information, the remote sensing platform in the space carrying remote sensing instruments, image formation by scanning, side-view radar, processing and treatment of the image data recorded by remote sensing instruments, and the technique of reading the images are discussed.

AUTHOR: TONG Ying [4547 5491]

ORG: None

TITLE: "Eyes for Developing the Ocean--Underwater Television"

SOURCE: Beijing DIANZI SHIJIE [ELECTRONICS WORLD] in Chinese No 8, 80 pp4-6

ABSTRACT: In the struggle to conquer the seas, underwater television serves as our eyes to see all the treasures of the oceans, which occupy 70 percent of the earth's surface. This paper describes the structure, types, applications, and development of underwater television. In a small column attached to the end of the paper, the SSX-200 underwater television designed and produced by Xiamen Electronic Instrument Plant, capable of working in oceans, lakes, rivers, and reservoirs, where the water is less than 200m in depth is reported. Drawings depicting the structure and the work procedure of underwater television are given.

AUTHOR: QI Bin [7871 0365]

ORG: None

TITLE: "Automobile Electronics"

SOURCE: Beijing DIANZI SHIJIE [ELECTRONICS WORLD] in Chinese No 8, 80 p 7

ABSTRACT: The automobile is a convenient device and the most commonly used tool of land transportation, but it is still not very satisfactory. It is not very safe, its engine makes too much noise, and it discharges a large quantity of gaseous exhaust. There have been many attempts to reconstruct the automobile with electronic monitoring and control technology. Electronic instruments being studied for improving automobiles include the following 3 aspects: (1) Devices for monitoring the condition of the driver to detect such condition as being drunk, falling asleep, etc. (2) Security devices, such as electronic lock, burglary alarm, etc. (3) Collision preventive devices, including collision preventive radar and automatic brakes. This paper includes a brief discussion of attempts of using electronics to improve automobiles. A drawing of an automobile is given to depict the locations where these electronic devices may possibly be installed.

AUTHOR: YUAN Shuren [5913 2885 0088]

ORG: None

TITLE: "Silver Oxide Button-like Batteries"

SOURCE: Beijing DIANZI SHIJIE [ELECTRONICS WORLD] in Chinese No 8, 80 p 11

ABSTRACT: Today's pocket-size calculators and electronic watches operate on silver oxide cells that look like a button. This paper explains the way silver oxide cells are made and they come in 4 diameters and 5 thicknesses and the user must choose the right type when a replacement is needed. The paper also cautions against using metal pincers to handle silver oxide batteries or incinerating used silver oxide batteries.

AUTHOR: REN Shilong [0117 0013 7127]
ZHANG Runquan [1728 3387 2164]

ORG: None

TITLE: "Semiconductor Circuit Knowledge (VI): Exposing the Secret of Low Frequency Power Amplifier (I)"

SOURCE: Beijing DIANZI SHIJIE [ELECTRONICS WORLD] in Chinese No 8, 80 pp20-21

ABSTRACT: The final stage output of radio receivers and loudspeakers must be in a specified voltage and current; therefore, it is also called power amplifier. Due to the fact that the signals are in audio frequencies, they are also called low frequency amplifiers, which may generally be divided into 3 types. This installment of the paper introduces briefly the A type one tube [transistor] power amplifier and the B type push-pull power amplifier. The circuit structure and the work principle of both types are described, with the B type in more detail than the A type.

AUTHOR: (1) WU Baogang [0702 1405 0474]
(2) GUO Chaobin [6751 2600 2430]
(3) WANG Guoren [3769 0948 0088]
(4) None

ORG: None

TITLE: "Reform and Application"

SOURCE: Beijing DIANZI SHIJIE [ELECTRONICS WORLD] in Chinese No 8, 80 pp 27-28

ABSTRACT: This column contains 4 items. The third item listed in the table of contents, SSX-200 Underwater Television is missing in the column. (1) Ultrasonic wave and its application: A definition of ultrasonic wave, the history of its discovery, and its industrial applications are briefly discussed. (2) Automatic protection device for thyristor [silicon controlled rectifier] battery charger: A circuit capable of effectively improving the overload capability of thyristor is introduced. (3) Simple open-phase protective circuits: Three types are very briefly introduced. (4) Transistor ignition devices: Two types, made respectively by Sichuan Mianyang State-operated Peijiang Wire Electric Plant Electronic Instrument Branch and State-operated Huafeng Radio Electrical Instrument Plant are introduced. Both are intended as an accessory to the ignition system of the automobile.

6168
CSO: 4009

AUTHOR: XU Yiqian [1776 4135 6197]
YAO Weiwen [1202 0251 2429]
FANG Qiuhua [2455 4428 5478]

ORG: None

TITLE: "Studies on JS-I MHD Generation Experimental Installation"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 1-13

TEXT OF ENGLISH ABSTRACT: This paper gives a comprehensive picture of the studies conducted on a model MHD generation experimental installation consisting of MHD generator, inverter, combustor, high-temperature air preheater, seed-recovery equipment, measuring facility and steam generator. Some of the experimental results obtained on the given installation since 1969 are also presented.

AUTHOR: None

ORG: Generator Section, Research Laboratory of MHD Generation

TITLE: "Experimental Investigation of Faraday MHD Generator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 14-22

TEXT OF ENGLISH ABSTRACT: The construction of the No 5 channel for the JS-1 MHD generator and some experimental investigations on this channel are described. The results of experimental investigations described in this paper include: (1) the problem of reasonable organization of flowing conditions; (2) pressure, velocity and temperature distributions along the channel; (3) the insulating properties of the channel; (4) the voltage drop across the electrode boundary layer; (5) the open-circuit voltage, short-circuit current and power distributions along the channel; (6) the ratio of extractive power to ideal power; (7) effect of seed on the insulating property and durability of magnesite bricks in the channel.

AUTHOR: FANG Yilin [2455 0001 7792]

ORG: None

TITLE: "Calculation and Analysis for the Electrical Performance of Faraday MHD Generator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 23-28

TEXT OF ENGLISH ABSTRACT: This paper analyzes the effects of several factors on the power output, including load coefficient, voltage drop in electrode boundary layer, electrode resistance, axial and transverse leakage current and finite segmentation of electrodes.

A formula for calculating power output is derived. It also indicates the minimum requirements for the different factors as mentioned above that must be met in order to limit their effects on power output to a given value.

AUTHOR: CHEN Xiuhua [7115 4423 5478]
WAN Caichun [8001 2088 2504]
YAO Chunli [1202 2504 7787]
FANG Qiuhua [2455 4428 5478]

ORG: None

TITLE: "Gas Velocity Measurement in MHD Generator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 29-35

TEXT OF ENGLISH ABSTRACT: For gas flow at high temperature and high speed in MHD-channel, a method of measuring gas velocity without physical contact is discussed in this paper. The random perturbations which exist in the MHD-channel are used as information to measure the speed of gas flow in the channel. Based upon the principle of correlation of random signals we have constructed equipment to measure the difference of time between two measuring points. In the paper the correlative principle of measuring speed is explained and the block diagram is given. The block diagram and circuit diagram are given in detail for another piece of equipment which measures the average difference of time without correlation. The measured results and the analysis of errors are also given.

AUTHOR: ZHAO Yiyu [6392 0110 6877]
WAN Caichun [8001 2088 2504]
ZHOU Peijun [0719 0012 6874]
DAI Liming [2071 4539 6900]
GONG Lenian [7895 2867 1628]

ORG: None

TITLE: "Active Inverter for Faraday Type MHD-Generator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 36-41

TEXT OF ENGLISH ABSTRACT: The schemes of the main circuit and the control system of the active inverter connected to a JS-1 Faraday type MHD-generator electrode-pair are described. The features of the inverter and the design considerations are pointed out and illustrated by experimental results.

AUTHOR: ZHAO Yiyu [6392 0110 6877]

ORG: None

TITLE: "Calculation of Static Parameters of Inverter for Faraday Type MHD Generator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 42-47

TEXT OF ENGLISH ABSTRACT: This paper presents a method of calculation for the static parameters of an inverter which takes into consideration the fact that the equivalent internal resistance in the MHD generator is high. The effects of parameter variation on the performance of the inverter are also discussed.

AUTHOR: SU Huaqin [5685 5478 2953]
LIU Qianxin [0491 0467 9515]
LIU Chuanbo [0491 0278 0590]
JIN Wanmin [6855 8001 2404]

ORG: None

TITLE: "Design and Experimental Study of the High Temperature Pebble-Bed Air Preheater"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 48-59

TEXT OF ENGLISH ABSTRACT: The first high temperature stationary matrix pebble-bed regenerative air preheater in our country designed and built in 1971 is described in this paper. The preheater, with an air outlet temperature of 1550-1600°C and a rate of temperature drop of 1.5°C/min, satisfies the requirements of MHD power generation. From our test results, the performance characteristics of the preheater are as follows: the empty-tube air velocity--0.65 Nm/s; temperature of the discharged gas--250°C; overall heat transmission coefficient--12-20 Kcal/m^2 · °C per cycle; and maximum gas pressure drop across the bed--1000 mm H_2O. It is shown that the pebble-bed preheater is correctly designed, and the methods of calculation and the design constants adopted are suitable.

AUTHOR: ZHANG Mingyao [4545 0682 5069]
CHEN Xiangyong [7115 4382 2837]
ZHANG Mujin [1728 1970 3866]
TANG Huifen [0781 1979 5358]

ORG: None

TITLE: "The Combustor of JS-1 MHD Installation"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 60-68

TEXT OF ENGLISH ABSTRACT: In this paper the construction of the hot-wall type combustor in a small-scale MHD plant and the experimental study carried out on it are described. In the burner, compressed air is used as the atomizing medium, light diesel oil as the fuel, and high-temperature preheated air at 1520-1750°K as the oxidant. Heat loss of the combustor is estimated to be below 3 percent, and the degree of complete combustion is almost perfect. The corresponding temperature of the products of combustion ranges over 2570-2700°K at the inlet of the MHD generator. The results of measurements on the temperature of the hot gas, the composition of the products of combustion, the losses, etc., are also listed.

AUTHOR: WANG Shimin [3769 1709 3046]

ORG: None

TITLE: "Temperature Measurement of High-Temperature Flame in MHD Generator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 69-75

TEXT OF ENGLISH ABSTRACT: An experimental device is developed for measuring the temperature of high-temperature flame in the MHD generator. The basic principles, the construction and the method of operation of the device are described. An analysis of its errors is given. Some problems for further research are pointed out at the end of the paper.

AUTHOR: LI Daji [2621 1129 7535]

ORG: None

TITLE: "A New Seeding Material for MHD Generation"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 76-81

TEXT OF ENGLISH ABSTRACT: In this paper it is proposed to use "mixed soda"--the waste liquid from the industrial production of lithium salts, as an additive in a large-scale MHD-steam power station. Theoretical analysis and experimental results on this material are presented.

AUTHOR: None

ORG: The Research Institute of Nanjing Chemical Industry Company

TITLE: "Seed Recovery Technique for MHD Generation"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 82-89

TEXT OF ENGLISH ABSTRACT: This paper gives a general review of the previous research works on low temperature seed recovery in foreign countries, and also describes the seed recovery process, equipment, operating conditions and the purification index attained by the "spray-cup absorber-sieve-plate absorber-venturi scrubber" system which has been mounted in the NTI JS-1 model installation.

Tests on the wet electrostatic precipitator are also described and the practical application of the solubility isotherm diagram of K_2CO_3-$KHCO_3$-K_2SO_4-H_2O system to wet seed recovery process is also discussed.

AUTHOR: JIANG Chizhi [5592 2170 1807]
LI Fuan [2621 4395 1344]
JIANG Lianwu [5592 6647 2976]

ORG: None

TITLE: "Research on a Fluidized Boiler Used in MHD-Steam Power Plant"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 90-100

TEXT OF ENGLISH ABSTRACT: The research on an experimental steam boiler used in a MHD-steam power plant is described. The international state of the art on the topic is also presented.

It is noticed that the agglutinating and blocking on the wall of the boiler at temperatures of 800-1200°C is a critical problem for the design of the boiler. A fluidizing technique offers a solution to this problem.

The construction of the fluidized boiler and the test results are also presented.

AUTHOR: JIANG Chizhi [5592 2170 1807]

ORG: None

TITLE: "Calculation of the Combined Cycle Efficiency for Large-Scale MHD-Steam Power Generation"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Special Edition No 3, 1979 pp 101-108

TEXT OF ENGLISH ABSTRACT: This paper introduces the results of calculation of the combined cycle efficiency for large-scale MHD-steam power generation which uses mazout and coal respectively as fuels. The difficulties of burning coal are discussed. Results of calculation are compared with the corresponding calculation from abroad, and it is pointed out that the combined cycle efficiency of MHD-steam generation exceeds 50 percent in all cases for stations in the order of thousands of MW using preheated air as the oxidizer. Thus, MHD generation is a practical way of raising the efficiency of the utilization of coal.

9717
CSO: 4009

AUTHORS: CHEN Yuanmou [7115 6678 6180]
YI Jianru [2496 0313 1172]

ORG: None

TITLE: "Trains Speeding over the Silk Road"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese, No 6 Jun 80 pp 1-2, 22

ABSTRACT: The authors describe the newly completed Turfan-Ku-er-le railway, which becomes the second main railway line in Sinjiang province. Starting from Turfan in the Lanzhou-Urumqi railway, the railway runs southward through Yu-er-gou, Baluntai, Hojing, Yenshi to reach Ku-er-le, at the northern edge of the Tarim Basin, and has an overall length of 476 kilometers. The description emphasizes the geographical and economical significance of the railway that will greatly improve the communications between the norther and southern Tianshan areas, and promote the interflow of commodities between Chinese inland and her border region.

AUTHOR: MAO Xiaolan [0602 2556 1526]

ORG: None

TITLE: " Wild Edible Fungi of China"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese, No 6 Jun 80 pp 3-5

ABSTRACT: Following an introduction to the occurrence, habit and characteristics of some species of well known wild, edible mushrooms from northeastern China, regions north of Zhangjiakou in Hobei province, Fujian province, southwestern China, Gobi desert, and Chinghai and Tibetan plateau, the author discusses the importance of conducting further investigation and studies of this natural resources in China for further exploitation and utilization, and its significance in enriching provisions, improving people's health, and extending foreign trade. It is reported that there are more than 300 species of wild edible mushrooms in China known so far.

AUTHOR: YU Xizhang [0205 6932 4545]

ORG: None

TITLE: "Chinghai Prairie's Harmful Rats"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese, No 6 Jun 80 pp 6-7

ABSTRACT: Based on an introduction to the general features, habits, activities, and characteristic damage to grasslands of five typical rats over the Chinghai praries, namely: the plateau "rat-rabbitts", the long tail barn rats, the Tibetan "rat ghosts", the Chinese zokor, and the five-toe jerboa, and the estimated annual damage they incurred, a discussion is made on the various chemical methods to control them, which should be at least 90% effective to compensate their rapid rate of propagation. Spraying of 0.2% fluoroacetamide that has proved to be 98% effective is recommended.

AUTHORS: CHEN Renjun [7115 0088 6874]
SUN Yufei [1327 3022 7378]
JIANG Muqing [5592 2606 7230]

ORG: None

TITLE: "Mt. Jiuhua - First Mountain of Southeastern China"

SOURCE: Beijing DILI ZHIHSHI [GEOGRAPHICAL KNOWLEDGE] in Chinese, No 6 Jun 80 pp 8-10

ABSTRACT: This article reports an excursion around Mt. Jiuhua, 20 kilometers southwest of Chingyang city in southern Anhui province, which is known throughout the Chinese history as one of the four largest Bhuddist sacred land in China. The main peak of the mountain group is 1,323 meters altitude. The report covers description of the route of the excursion, the various old Bhuddist temples, shrines and relics that scattered throughout the mountains, the inscriptions by many well-known poets, scholars and politicians throughout the centuries over the rocks, the fantastic sceneries of the mountains, peaks, clouds and rivers , as well as pine trees, and the geological formations of the mountains. The area is now under the management and protection of a "Mt. Jiuhua Park Administration".

AUTHOR: DENG Yuyou [6772 6735 0645]

ORG: None

TITLE: "A Visit to Nanwan Monkey Peninsula"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese, No 6 Jun 80 pp 10-11

ABSTRACT: The author reports a visit to the Nanwan Peninsula, which is the only monkey protection area in China, where the near extinct Guangxi monkey species are being domesticated. The peninsula is situated at the eastern section of the Li and Miao Autonomous Chou in Hainan Island, more than ten kilometers from Lingshui County, where the climate, vegetation and terrain are ideal for their domestication. Starting from barely 50 to 60 monkeys, there are now almost 1,000 monkeys, divided into 25 groups, under the command of one monkey king. Besides protecting them from extinction, the monkeys are also the source of a very expensive ingredient of traditional Chinese medicine, a delicacy of Chinese gourmet, as well as experimental animals.

AUTHOR: ZHENG Qipu [6774 0796 3184]

ORG: None

TITLE: "A Chinese Northernmost Scientific Research Experimental Station"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 6 Jun 80 p 13

ABSTRACT: The northernmost Chinese scientific research experimental station is the Frozen Earth Research Experimental Station of the Frozen Earth Research Team of the Third Prospecting Design and Planning Institute of the Ministry of Railway at the right bank of the upper reaches of the Amur River in Heilungjiang province. Besides establishment of the meteorological characteristics of the area during the last five years, it was observed that frozen earth of many years' old was about 0.5-1 meter below the ground surface, with 63 meters maximum thickness. Other research includes also such railway engineering related subjects as geological road foundation, culvert and bridge tunnels, house construction, and water supply and drainage.

AUTHORS: DU Ronghuan [2629 2827 2719]
ZHONG Dunlun [6945 2415 0243]

ORG: None

TITLE: "First National Mud Rock Flow Conference Convened at Chengdu"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese, No 6 Jun 80 p 29

ABSTRACT: Sponsored by the Chinese Academy of Sciences, the First National Mud Rock Flow Conference was convened at Chengdu on 15-20 April 1980, and attended by representatives from 70 related units. 64 of the more than 100 research papers received on various correlated subjects were read and discussed. In addition, there were also 15 special reports and educational movies. Zhao Beiko [6392 0554 0344] deputy secretary-general of the Chinese Academy of Sciencesalso made important speech and instruction.

11,206
CSO: 4009

AUTHOR: YANG Shipu [2799 1709 3302]
HOU Hungfei [0186 7703 7378]
GAO Lianda [7559 5114 6671]
WANG Zengji [3769 1073 0679]
WU Xianghe [0702 4382 0735]

ORG: YANG of Wuhan College of Geology; HOU, GAO and WANG of the Institute of Geology, Chinese Academy of Geological Sciences; WU of the Geological Bureau of Guizhou

TITLE: "The Carboniferous System of China"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 167-175

TEXT OF ENGLISH ABSTRACT: The Carboniferous System of China is chiefly distributed in the Tienshan-Xingan geosyncline of north China, in the Changjiang paraplatform of south China and in the Kunlun-Qinling, western Yunnan-Himalaya geosynclines of western China.

Based on both the characteristics and the origin of the marine fauna, three

[Continuation of DIZHI XUEBAO No 3, Aug 80 pp 167-175]

paleobiogeographical provinces may be differentiated during the early Lower Carboniferous epoch in China: 1) South China Province (Chinese type), 2) Northern China Province (mainly Siberian-North American type), and 3) Western China Province (mixed type of south and northern China). In the later epoch of the Lower Carboniferous the three provinces seemed to have combined into unified Chinese See and formed actually a part of the extensive Tethys of eastern Asia.

A correlation of the Carboniferous within China and an intercontinental correlation of it, as well as boundaries between biostratigraphical subdivision of Carboniferous System, are discussed in this paper.

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WANG Shitao [3769 1102 3447]
LIU Shiyu [0719 2514 7183]
GU Qichang [7357 0366 2490]
JIA Hang [6328 5300]

ORG: PAN of the Museum of Geology; WANG of the Institute of Geology, Chinese Academy of Geological Sciences; LIU, GU and JIA all of the Regional Geological Team, Geological Bureau of Ningxia Hui Autonomous Region

TITLE: "Discovery of Devonian Bothriolepis and Remigolepis in Ningxia"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 176-185

EXCERPT FROM ENGLISH ABSTRACT: Two new species of Devonian Antiarchi from the Ningxia Hui Autonomous Region, northwest China, are described.

In 1973, the Ningxia Regional Geological Team collected for the first time a few broken Bothriolepis plates from the Devonian red beds in Niushoushan near Country Zhongning, about 150 km southwest of Yinchuan. Further excavation at the same locality was made the next year and a great number of specimens belonging to new species of Bothriolepis and Remigolepis were found. The present

[Continuation of DIZHI XUEBAO No 3, Aug 80 pp 176-185]

Remigolepis material is the first of its kind to be discovered not only in China, but also in east Asia.

AUTHOR: SHEN Shumin [3088 3219 2404]

ORG: Institute of Geomechanics, Chinese Academy of Geological Sciences

TITLE: "A Preliminary Analysis and Model Experiments of the Stress Field of the Sinuous Type of Epsilon Structures in the Nanling Region"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 186-194

TEXT OF ENGLISH ABSTRACT: On the Chinese continent, an important feature showing regular distribution of the ε-type structures is the successive occurrence, on one and the same latitude (or longitude), of the ε-type structures with their front projecting to the south (or west) in a sinuous pattern of alignment. Judging from the mode and direction of the crust movement they manifest, such ε-type structures whould be regarded as a variety of the latitudinal or longitudinal structural belt, the morphological property of their distribution further reflecting the boundary conditions and the manner of action of the body force in the areas of their occurrence.

A series of ε-type structures in the Nanling Range region is a typical example of this group of structures. In the present paper, the distribution regularity of the sinuous ε-type structures in this region and the mechanical process of

[Continuation of DIZHI XUEBAO No 3, Aug 80 pp 186-194]

their formation are preliminarily analyzed and summarized in terms of mechanics. Mathematic deduction and model experiments on mud plates have been performed. The deformational features obtained from the model experiments on mud plates have shown a general coincidence with the field geological observations and the characteristics of the stress field determined from the above mechanical models. Thus, the theoretic interpretation and the results of the experiments have, to some extent, proved the theoretically inferred origin of the sinuous ε-type structures in the Nanling region.

AUTHOR: WU Hanquan [0702 3352 3123]

ORG: Xi'an Institute of Geology and Mineral Resources

TITLE: "The Glaucophane-Schists of Eastern Qinling and Northern Qilian Mountain in China"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 195-207

TEXT OF ENGLISH ABSTRACT: The glaucophane-schists found in eastern Qinling and the northern Qilian Mountain extend for 100 and 200 km respectively. These two belts are generally associated with melanges, eclogite (c) and ultrabasic rocks, but differ to a certain extent in their mineral associations. The former consists mainly of crossite, magnesian riebeckite and albite, while the latter consists mainly of glaucophane, garnet, epidote, quartz and the common mineral chloritoid, with phengite occurring in both. It is obvious that both metamorphic belts are the products of low temperature, high pressure metamorphism. However the temperature range of the eastern Qinling metamorphic belt is rather broad while the pressure of northern Qilian Mountain is higher. Based upon the tectonic characters, stratigraphical successions, etc., it is believed that the age of plate tectonic subduction of northern Qilian Mountain was in Early Paleozoic and that of eastern Qinling in Early Mesozoic.

AUTHOR: CHEN Fajing [7115 4099 2529]
WANG Defa [3769 1795 4099]

ORG: Both of Wuhan Geological College

TITLE: "Formation Types in the Tertiary Petroliferous Basins of China and Their Relations to the Distribution of Oil and Gas"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 208-218

TEXT OF ENGLISH ABSTRACT: Formations refer to rock associations closely related to each other in their origin under certain tectonic conditions. So far the following main formation types can be recognized in the Tertiary petroliferous basins in China: molasse-like formation, piedmont coarse elastic formation, red formation, volcanic formation, lacustrine carbonate formation, and alluvial plain formation. The formation types in the basins of eastern China are quite different from those found in the basins of western China. The most common formation types in the rift-valley basins of eastern China are represented by: 1) the piedmont coarse elastic and volcanic formations resulting from the initial stage of the development of basins, and the lacustrine evaporite formation from the transitional stage of the development of basins; 2) the lacustrine sand-clay formation with the sedimentary features characteristic of

[Continuation of DIZHI XUEBAO No 3, Aug 80 pp 208-218]

delta, subagueous alluvial fan and turbidites, which developed on the active steeper side of the basin controlled by the growth faults, and the lacustrine carbonate formation found on the stable slope of the basin, both formation types representing products of the summit stage of the development of basins; and 3) the alluvial-plain formation resulting from the closing stage of development of basins. The most common formation types for the inland intermountain basins of western China are represented by both red and molasse-like formations.

The above-mentioned formation types found in the intraplate basins are controlled by such factors as: 1) the tectonic nature of basins and its change, 2) the physiographic landscape, and 3) the climatic conditions.

The development of source rocks and reservoir rocks and their salient features are closely connected with the presence of formation types. It should be noted, in particular, that the evaporite formaticns are favorable not only to the development of covering beds but also to the formation of salt-dome structures, which are always proved to be good traps for oil and gas accumulation.

AUTHOR: YE Qingtong [5509 1987 0681]
WU Xuehan [0702 1331 3352]
LI Mujie [2621 1970 2638]
DENG Shinong [6772 0099 0309]

ORG: YE and WU both of the Institute of Mineral Deposits, Chinese Academy of Geological Sciences; LI and DENG both of Geological Team No 723, Guangdong Bureau of Geology

TITLE: "The Genesis of the Iron Deposit in Jianshan, Guangdong"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 219-232

TEXT OF ENGLISH ABSTRACT: The characteristics of the formation of the Jianshan iron deposit is a typical example among the iron deposits of this in eastern Guangdong. The localization of the iron deposit is controlled by the contact zone of Jianshan granite and the limestones belonging to various units (from the upper part of Lower Carboniferous to the Lower Permian Qixia Formation). The ore bodies in the northeast-trending downwarps are arranged in echelons. The Jianshan granite is a small marginal stock of the Wuping-Dabagranitic batholith, and intruded in the early stage of the Yanshanian Orogeny with an isotopic

[Continuation of DIZHI XUEBAO No 3, Aug 80 pp 219-232]

(K-Ar) age of 147.3 m.y. According to the geological data and triclinity of the potash feldspar it was formed at a depth of 2-3 km and at a temperature of from 600-700°C. The iron ore is nothing but a magnetite-bearing skarn, being mineralized during one of the stages of the contact metasomatism. A series of repeated magnetizations gave rise to several generations of magnetite, which occurs in two forms, i.e., the filling-magnetite and the metasomatic type, both being formed within a temperature range of 310-560°C. Geological evidence and isotopic data suggest that the iron was derived from the various sources, including the possibility of partially sedimentary in origin, but their transporting was closely related to the action of the potash-bearing fluids.

AUTHOR: XU Xiaofeng [6079 2556 1496]

ORG: North China Metallurgic-Geologic Corporation

TITLE: "Some Petrological Characteristics of a Certain Alkali-Ultrabasic Intrusion in North China and Discussion of the Genesis of Related Iron-Phosphorus Deposits"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese No 3, Aug 80 pp 233-247

TEXT OF ENGLISH ABSTRACT: The emplacement of the intrusion which occurs in the western uplift bordering the southern part of the Yanshan depression is controlled by a deep fault and the Heishansi fracture. Pyroxenitic rocks, occurring in thin layers, are found in a rhythmic multilayered lopolith near the center of the intrusive body and the iron-phosphorus ore deposits have a tendency to occur in the middle-upper part of the intrusive.

The evolution tendency of the intrusion is from alkali-ultrabasic to subalkaline and belongs to the alkali-basalt magma series. Its mineral content, oxidation coefficient, basicity and ratio of the related constituents reveal a clear rhythmic variation.

[Continuation of DIZHI XUEBAO No 3, Aug 80 pp 233-247]

The ore-forming material of the deposits is originated from an iron-phosphorus magma. The deposition of the ore is largely controlled by the volatile components and basicity of the ore magma. During the cooling of the magma a crystal field is formed, in which the crystallization sequence and characteristics of the evolved lattice structure of silicate minerals are as follows: inosilicates (ferriaugite $[SiO_3]^{-2}$)→layer silicates (Biotite $[Si_2O_5]^{2-}$)→ framework of silicates (orthoclase $[Si_4O_8]^{2-}$); the evolution of cations being:

Fe^{2+}, Fe^{3+}, Mg^{2+}, $Ca^{2+} \rightarrow Ca^{2+}$, P^{5+}, Mg^{2+}, Fe^{2+}, Fe^{3+}, Al^{3+}, $K^{1+} \rightarrow K^{1+}Al^{3+}$.

The volatile components were more favorable for Al^{3+}, K^{1+}, H_2SiO_4 deposition at the upper fusion-field magma of crystallization, where alumina-silicates are formed while the iron-phosphorus ore-magma is deposited in the middle-upper part of the crystallization field.

9717
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TITLE: "Measurement of Intensity and Momentum Spectrum of Horizontal Cosmic Ray Muon at 3220 Meters Above Sea Level"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 409-412

TEXT OF ENGLISH ABSTRACT: At an altitude of 3220 meters above sea level in Yunnan, the muon intensity above 2.0 GeV/c was measured at large zenith angles $(78.4-90^{\circ})$ by a G-M hodoscope. At mean zenith angle of 86.2°, the measured result was $(9.2 \pm 1.0) \cdot 10^{-5}\ \mathrm{cm}^{-2} \cdot \mathrm{sr}^{-1} \cdot \mathrm{s}^{-1}$.

By a magnetic cloud chamber, the muon spectrum at the same zenith angles was measured in the momentum region of 2-51 GeV/c.

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TITLE: "Identification of the Horizontal Cosmic Ray Penetrating Particles"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 413-416

TEXT OF ENGLISH ABSTRACT: An experiment using a large magnetic cloud chamber to search for new particles in horizontal cosmic rays is described. The result is: the flux of particles with unit charge $\beta < 0.7$, $m > 1\ \mathrm{GeV}/c^2$ or the flux of relativistic fractional charge particles is less than $3 \times 10^{-8}\mathrm{cm}^{-2}\mathrm{sr}^{-1}\mathrm{sec}^{-1}$.

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TITLE: "Deep Inelastic Scattering Processes of the Neutrinos on Polarized Nucleons"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 417-422

TEXT OF ENGLISH ABSTRACT: By using the distribution functions of the valence stratons with definite helicities, the differential cross sections and asymmetries of the deep inelastic scattering processes of neutrinos or antineutrinos on polarized nucleons are computed.

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TITLE: "The Anti-Commutative Self-Inverse Matrices and the Transformations in Eigenvalue Problems"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 423-432

TEXT OF ENGLISH ABSTRACT: With a representation of the rotation group induced by the anti-commutative, self-inverse matrices, the transformations named by Foldy-Wouthuysen, Cini-Touschek, Chakrabarti and others are treated from a unified viewpoint. A new transformation is found. Some applications of this method in the eigenvalue problems are demonstrated.

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TITLE: "On the Probability Interpretation of the Bound State Wave Function of the Meson"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 433-439

TEXT OF ENGLISH ABSTRACT: The probability interpretation of the bound state meson wave functions is discussed by taking the 0^- meson wave function solved for the nearly flat bottom potential as an example. On the one hand, given a probability amplitude sense to the three-dimensional wave function of the meson in the configuration space obtained under the equal time limit of the four-dimensional covariant wave functional solved from the B-S equation, the averaged

[Continuation of GAONENG WULI YU HE WULI Vol 4 No 4, Jul 80 pp 433-439]

radius $\langle r^2 \rangle$ of the meson can be calculated. On the other hand, the electromagnetic average radius $\langle r^2 \rangle$ is evaluated from the slope at the origin of the space-like electromagnetic form factor of the meson calculated directly from the four-dimensional B-S wave function. The two averaged values are compared and turn out to be in good agreement (except for the case of scalar coupling, in which the difference is about 30 percent). This shows that although the four-dimensional B-S wave function does not possess a definite sense of probability amplitude, it might, nevertheless, be plausible to give such a sense to the three-dimensional configuration space wave function of the meson obtained from the four-dimensional one under the equal time limit.

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TITLE: "The Quasi-Particle Model of Quarks and the Phase Transition in Meson States"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 440-444

TEXT OF ENGLISH ABSTRACT: A model is proposed in which a meson is considered as a collective vibrational state consisting of various quark-antiquark pairs. Whereas the quarks are quasi particles having undergone a superconductivity phase transition, there is a characteristic softening phenomenon in the meson spectrum near the critical point of phase transition. After discussing the meson states with isospin I=0 (spin S=0, 1) and I=1 (S=0) respectively, it is argued that phase transition occurred in all of them.

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TITLE: "Unitary Symmetry in Baryon-Antibaryon Systems"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 445-454

TEXT OF ENGLISH ABSTRACT: In this paper, we assume that the proton, neutron and Λ hyperon are the basic particles which belong to the fundamental triplet of the group SU_3. Thus baryonium is to be classified in the representations of SU_3. In addition, the "original" mass difference between Λ hyperon and the nucleon exhibits the violation of unitary symmetry which causes the splittings of energy levels and leads to the formations of the "unitary symmetrical energy band." The analysis in this paper of the energy levels of $B-\bar{B}$ systems shows the existence of the energy band. Furthermore, we find that the theoretical values obtained are quite consistent with the experimental ones.

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TITLE: "A Model to Calculate K-M Matrix Using Horizontal Gauge"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 455-458

TEXT OF ENGLISH ABSTRACT: A model of horizontal gauge is given, where $s_1 \approx \sqrt{2}\, m_d/m_s$ and $s_2 \approx s \approx \frac{m_s^2}{\sqrt{2}\, m_b^2}$ and $b \rightarrow u + W^-$ is the main decay mode of the quark b.

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TITLE: "τ Vacuum"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 459-465

TEXT OF ENGLISH ABSTRACT: While discussing the stationary soliton solutions of a real spin-less field in one spatial dimension, we notice that there exists another kind of strict solution in scalar field theory. The field's total energy, momentum and angular momentum all vanish, hence the vacuum, termed "τ vacuum," represents the zero-point vibration. Moreover, if the canonical momentum's being zero $\pi = 0$ or φ's being real is demanded, then the τ vacuum automatically gives the ordinary vacuum solutions which indicate that the symmetries are spontaneously broken. In this article, the first-order quantum-like correction for the φ^4 theory, Sine-Gordan theory and the L rank potential are discussed respectively. Although this kind of vacuum solution is an imaginary one, it is important for studying the vacuum's mechanism, for upon transforming it into Euclidean space it becomes the ordinary soliton solution.

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TITLE: "The Absolute Yield of the Secondary Hadrons in pp Collisions and the Rule of L=1 Meson Production"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 466-477

TEXT OF ENGLISH ABSTRACT: Based on the quark model of multiple production, starting from the N(Q) relation obtained by the author previously, a systematic method of calculating the absolute yield of secondary hadrons is given. After an analysis of the few data about the production of L=1 mesons, it is found that if the production of L=1 mesons has the same SU(6) broken symmetry as that of L=0 mesons the ratio of their yield would be 1:3. The yield of hadrons so calculated is in agreement with the experimental data. The current problem of η/ω, η'/η anomaly is also solved as a by-product.

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TITLE: "On the Wave Functions of the Nuclear Quadruple Oscillations"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 478-492

TEXT OF ENGLISH ABSTRACT: With the help of the commutation relations of the creation and annihilation operators, the wave functions for the nuclear quadruple oscillations are discussed. An explicit expression for the phonon wave functions constructed according to the group chain $U_5 \supset R_5 \supset SU_2 \otimes SU_2$ and some of their important relations are given. The unitary transformation coefficients from the basis mentioned above to the one constructed according to the group chain $U_5 \supset R_5 \supset R_3$ are also discussed. A formula for the transformation coefficients is given.

In this paper, a general formula of the multiplicity factor for given angular momentum quantum number I and seniority number P is derived and a table of the P and I values for $P \leq 30$ is given.

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TITLE: "Another New Way for Sensitizing Cellulose Acetate Solid State Track Detector--Sensitizing by Swelling"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 493-502

TEXT OF ENGLISH ABSTRACT: Swelling treatment can increase the chemical activity of cellulose and its derivatives in heterogeneous reactions. Hence we consider it possible to activate cellulose acetate solid state track detector by swelling. After testing nine sorts of cellulose acetate detector materials, we found that swelling with water could effectively increase their sensitivity, so that they could record α particles greater than 5 MeV in energy. We also found that cellulose nitrate had a similar sensitization effect.

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TITLE: "Discussion on the Methods for Treating the Pairing Correlation"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 503-509

TEXT OF ENGLISH ABSTRACT: The advantages and defects of the two methods for treating pairing correlation are discussed. Assuming that the spacing of the single-particle levels near the Fermi surface is uniform, the influences of the pairing correlation on the binding energies, the energy spectra, two-particle transfer cross section and the branching ratios are analyzed. The importance of the Pauli principle manifests itself clearly.

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TITLE: "A Note on the Theory of Single Particle Potentials"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 510-515

TEXT OF ENGLISH ABSTRACT: It is well known that corresponding to the discrete (d) and continuous (c) energy spectra of the nuclei (N+1) and (N-1), the Lehmann representation of the single particle (sp) Green function $G_{\alpha\beta}(\omega)$ may be separated into two parts:

$$G_{\alpha\beta}(\omega) = G^{d}_{\alpha\beta}(\omega) + G^{c}_{\alpha\beta}(\omega).$$

Although $G^{d}_{\alpha\beta}(\omega)$ is a meromorphic function, $G^{c}_{\alpha\beta}(\omega)$ contains branch cuts. In our previous discussion of the non-hermitian sp potential $u_{\alpha\beta} = M_{\alpha\beta}(\varepsilon_{\beta})$ defined in terms of the mass operator $M_{\alpha\beta}(\omega)$, we have only considered $G^{d}_{\alpha\beta}(\omega)$ explicitly. This corresponds to a truncation approximation. In this paper, the consequences due to $G^{c}_{\alpha\beta}(\omega)$ are further investigated. It is shown that besides a few new conclusions, all the results obtained previously remain true.

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TITLE: "Relaxation of the Neutron Excess Degree of Freedom in Deep Inelastic Reactions Induced by Heavy Ions"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAF FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 4, Jul 80 pp 516-530

TEXT OF ENGLISH ABSTRACT: The isotopic distribution for DIR yields has been obtained for very asymmetric system $^{40}Ar(E_{lab} = 263\ MeV) + {}^{238}U$. The fragment identification was done by the combination of two independent time of flight and two ΔE-E measurements.

[Continuation of GAONENG WULI YU HE WULI Vol 4 No 4, Jul 80 pp 516-530]

A simple classical model is presented to explain the experimental results for the N/Z degree of freedom. This model has also been tested for experimental results for very asymmetric systems ($^{40}Ar + {}^{197}Au$, $^{32}S + {}^{238}U$, $^{63}Cu + {}^{232}Th$ and $^{40}Ar + {}^{232}Th$) reported by other authors. The agreement between this classical calculation and all the experimental results appears to be satisfactory.

9717
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Natural Sciences

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TITLE: "The Integral Representation of Analytic Functions on the Bounded Domain in C^n"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 1-7

TEXT OF ENGLISH ABSTRACT: We can obtain the following results:
If D is a bounded domain in the space C^n, and its boundary ∂D consists of piecewise smooth orientable surfaces (or orientable differential manifolds), and can be normally divided, functions $F_{jm} \in A$, $N_j \in B$. Then for analytic functions f(z) on $\overline{D}$, we have the following integral representation:

$$f(z)=\frac{\varepsilon}{(2\pi i)^n}\sum_{j_1<\cdots<j_k}\int_{\sigma_{j_1\cdots j_k}}\frac{f(\xi)}{M^{n-k+1}}\sum_{p=1}^{k}(-1)^{k+p}\sum_{\beta_1,\cdots,\beta_{n-k}=1}^{n}\det{}_{(n)}$$

$$(H_{j_1},\cdots,[H_{j_p}],\cdots,H_{j_k},N,N_{\bar\beta_1},\cdots,N_{\bar\beta_{n-k}})d\bar\xi_{\beta_1}\wedge\cdots\wedge d\bar\xi_{\beta_{n-k}}\wedge$$

$$\wedge d\xi_1\wedge\cdots\wedge d\xi_n, \qquad (1)$$

[Continuation of XIAMEN DAXUE XUEBAO Vol 19 No 2, 1980 pp 1-7]

where $\sigma_{j1\cdots jk}$ are boundary surfaces of the domain D, and are (2n-k) dimension. $\varepsilon = \pm 1$ denotes the orientation of the boundary surface.

By the above results it is easy to derive Cauchy's formula of polycylindrical domain, Bergman-Weil's integral representation, Ayzenberg's integral representation of covex domain, Temlyakov's integral representation of n-multiple circular domain, Bochner-Matinelli's integral representation and the integral representation of classical domains from integral representation.

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TITLE: "On Calculations of the Transfer Coefficients Between the Sea and the Air in Different Air Stratification"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 17-26

TEXT OF ENGLISH ABSTRACT: A formula has been established for estimating the transfer coefficients of momentum, sensible heat and water vapor between the sea and the air in different air stratifications. A calculation has been made according to the formula of this paper for a reference surface of 10 m. The present results are compared with those obtained by using the approximate formula of Kondo et al.

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TITLE: "On Some Bionic Problems of the Compound Eyes of Insects"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 27-36

TEXT OF ENGLISH ABSTRACT: This paper discusses how to solve the bionic problems of superposition eyes and proves that in order to superpose well the images formed by the neighboring ommatidia for the same object, the following conditions must be satisfied: (1) the optical axes of the ommatidia must intersect at the same point, and (2) the ratio of the radius of the image sphere to that of the object sphere must be equal to the transversal magnification. Examples have been given to illustrate the methods of design and calculation for an artificial superposition eye.

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TITLE: "ESR Cavity for Use at High Temperatures"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 37-40

TEXT OF ENGLISH ABSTRACT: A low cost, easily constructed electron spin resonance (ESR) cavity for high temperature experiments is presented in this paper. The design considerations and construction of the cavity are described, and the experimental results discussed. With this cavity, sample temperatures of up to 700°C are reached without change in Q and the resonance frequency. In addition, desirable spectral line-shapes are obtained.

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TITLE: "Chemical Modeling of Biological Nitrogen Fixation. VI. Synthesis and Catalytic Activities of FeMo-co Modeling Compounds"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 41-49

TEXT OF ENGLISH ABSTRACT: Some features of the twin-sited dicubane-cluster structural model of nitrogenase active-center previously proposed by us are discussed. Based upon this model, a method for the synthesis of FeMo-co modeling compounds has been designed. Three series of FeMo-co modeling compounds have been synthesized, with Mo:S*:Fe = 1:~6:6~8 as required by the model. Two

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samples of the citrate series, obtained by ligand exchange of the chloride series with citrate, have been found to exhibit very high catalytic activity (turnover number per Mo: 20~30 min^{-1}) and selectivity (92~95 percent C_2H_4), approaching that of FeMo-co, in the reduction of C_2H_2 to C_2H_4 by KBH_4, and to show a certain well-confirmed nitrogenase activity as assayed by Shah and Brill's method after reconstitution with Av mutant UW_{45}.

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TITLE: "Chemical Modeling of Biological Nitrogen Fixation. VII. Selective Reduction of Acetylene as a Criterion of Polynuclear Coordination of Substrates on Cluster Active-Center"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 50-56

TEXT OF ENGLISH ABSTRACT: The catalytic activities and selectivities of FeMo-co and various nitrogenase-modeling systems in the reduction of acetylene to ethylene by KBH_4 have been compared. The high selectivities and high activities of FeMo-co (activity: turn-over number 34 min^{-1}, selectivity: 99 percent C_2H_4) and the modeling compounds synthesized in this laboratory (activity: turn-over number 20-30 min^{-1}, selectivity: 91-95 percent), in comparison with many other

[Continuation of XIAMEN DAXUE XUEBAO Vol 19 No 2, 1980 pp 50-56]

nitrogenase-modeling systems (MoO_2^{4-}-CySH, MoO_4^{2-}-CySH-Fe^{2+}, MoO_4^{2-}-insulin, $[Fe_4S_4(SCH_2\Phi)_4]^{2-}$ and MoS_4^{2-}), may be regarded as a criterion indicating polynuclear coordination activation of the substrate molecules on cluster active-center of FeMo-co and of the synthetic modeling compounds.

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TITLE: "Chemical Modeling of Biological Nitrogen Fixation. VIII. The Determination of Molybdenum, Iron and Sulfur in FeMo-co Modeling Compounds"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 57-62

TEXT OF ENGLISH ABSTRACT: A method for the determination of molybdenum, iron and sulfur in FeMo-co modeling compounds is proposed. The samples are treated consecutively with bromine, potassium chlorate and nitric acid, then evaporated almost to dryness twice with hydrochloric acid. The molybdenum and the iron are determined photometrically with the dithiol method and with the sulfosalicylic acid method respectively. The sulfur is determined photometrically with the morrin-thorium method after the solution is passed through a column filled with the H-form of sulfonic-acid type cation exchanger. The method proposed is satisfactory in precision and accuracy.

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TITLE: "The Effect of 2-Thiazolidinethione, Sodium Phenyldithiopropylene Sulfonate, and Chloride-ion on Copper Electrodeposition in Acidic Solution"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 63-73

TEXT OF ENGLISH ABSTRACT: The electrochemical behavior of 2-thiazolidinethione (H_1), sodium phenyldithiopropylene sulfonate (S_1), and chloride-ion on copper electrodes was studied by voltammetry and a.c. impedance methods. The results show that all the above-mentioned additives are adsorbed on copper electrodes at a rather wide range of potential, and that the adsorption of H_1 is stronger than that of S_1 and the adsorption process is diffusion-controlled; furthermore, S_1 and chloride-ion may be coordinated with copper ions. In addition, the effect of these additives on the electrodeposition of copper is discussed.

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TITLE: "Model SY-1 Meter for the Determination of Dissolved Oxygen in Seawater"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 74-80

TEXT OF ENGLISH ABSTRACT: The present paper describes a new model meter with an oxygen probe without a membrane for the determination of dissolved oxygen in seawater. It is designed after the principle of chronoamperometry. The precision of the apparatus is within ± 0.2 percent. The range of determination of dissolved oxygen is 0-8 ml-O_2/l and the error in determination is less than ± 1.0 percent. The working principle of the circuit and some of the data by this meter in various sea areas are also reported.

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TITLE: "A Study on the Phototactic Behavior of Sardine (*Sardinella perforata* Cantor) and Silverside (*Atherina bleekeri* Gunther)--Response to Diffused White Light and the Process of Adaptation to Iso-Illuminative Spectral Color"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 81-88

TEXT OF ENGLISH ABSTRACT: Sardine (*Sardinella perforata* Cantor) shows the highest phototactic ratio toward white light in the region of 0.1~1 lux, but with the increase of light intensity its phototactic ratio decreases. The reaction of the silverside (*Atherina bleekeri* Gunther) under the same conditions increases with the raising of the light intensity, and reaches its maximum within the 10~100 lux region.

Under the condition of iso-illumination, the phototactic response of sardine and silverside to white and colored lights, with the duration of light

[Continuation of XIAMEN DAXUE XUEBAO Vol 19 No 2, 1980 pp 81-88]

stimulation, shows different process of adaptation under different conditions. The variation of process of adaptation is also associated with the character of light stimulation.

AUTHOR: JIANG Sufei [3088 4790 5481]
ZHOU Zhaogen [0719 2600 2704]
ZHU Yaoguang [2612 5069 0342]

ORG: JIANG of the Department of Oceanography; ZHOU of Zhangpu Fisheries Bureau; ZHU of the Fisheries Research Institute of Fujian

TITLE: "Preliminary Studies on the Populations of the Hair-tail (Trichiurus haumela (Forskal) of the Fishing Ground in the South Fujian and Taiwan Bank"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 89-95

TEXT OF ENGLISH ABSTRACT: A comparison was made between the hair-tail populations from southern and northern regions of South Fujian and Taiwan Bank Fishing Ground, the differences estimated from the data of merictic characters, including the number of fin rays of the left pectoral fin and dorsal fin, the number of anal spines, the number of abdominal vertebrae, the number of left-upper and left-lower gill rakers, were shown by the method of discriminate function to be statistically significant. It was found that the eggs and larvae of hair-tails hauled during the same month in 1975-77 in these two regions were at the same stage of development. Based on this evidence, it was suggested that the hair-tail of these two regions should be divided into

[Continuation of XIAMEN DAXUE XUEBAO Vol 19 No 2, 1980 pp 89-95]

different ecological populations. They spawn in this fishing ground and should be considered as local populations of hair-tails. These groups of hair-tails are of great advantage to the administration of fisheries, and this should be taken into consideration when we estimate the fishery resources of this coastal region.

AUTHOR: LIN Yuguang [2651 1342 0342]
HE Yucheng [0149 3768 2052]
YANG Wenchuan [2799 2429 1557]
LU Shulian [4151 3219 5571]

ORG: All of the Parasitology Research Laboratory

TITLE: "Paragonimiasis in Yongan and Zhangpin Districts, Fujian"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 96-104

EXCERPT FROM ENGLISH ABSTRACT: During 1978-1979 a general survey on the epidemiology and etiology of Paragonimiasis was undertaken in Zhangpin and Yongan districts. There were 422 positives as shown by the intradermal tests made on 2,141 peasants and lumber workers with antigens prepared from adult Paragonimus worms. The incidence varied from 12.23 percent to 25.76 percent. During our investigation inquiries were made on the food habits of the verified positives of intradermal tests. Of them, 54.32 percent and 35.10 percent from the two above-mentioned districts answered to having eaten raw or partially cooked crabs.

Three species of freshwater snails, such as Semisulcospira toucheana, Tricula

[Continuation of XIAMEN DAXUE XUEBAO Vol 19 No 2, 1980 pp 96-104]

minutoides and Tricula sp., were found from the endemic area. Semisulcospira toucheana were found naturally infected with the cercariae of Paragonimus westermani in 0.031 percent to 0.41 percent of 12,802 snails examined, while the other two species, Tricula minuitoides and Tricula sp., were free from infection. Infected with the metacercarial cysts of P. westermani were 134 of 190 crabs (70.5 percent) from Zhangpin and 117 of 251 crabs (46.6 percent) from Yongan. The number of cysts per crab varied from 1 to 1,118 (average 52.06) in Zhangpin, and 1 to 503 (average 8) in Yongan. The distribution of cysts in the bodies of crabs was studied. It was found that the majority of them were in the muscles of pincers and walking legs (45.57 percent) and also in the thorax (51.20 percent).

AUTHOR: WANG Zaisheng [3769 0375 3932]
XU Hanlun [1776 4988 0243]

ORG: Both of the Biology Department

TITLE: "Effect of Calonyctin A on the Differentiation of Callus Tissues from Rice Pollens"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 105-109

TEXT OF ENGLISH ABSTRACT: Calonyctin A, a growth-regulating substance isolated from the leaves of Calonyction acculeatum, is an 11-O-pentaglycoside of ethyl jalapinolate. When it was added to the culture medium for growing rice callus tissue, it promoted the differentiation of green sprouts, making the green sprouts differentiate easily on those cultures that had hardly been able to undergo further differentiation due to too much root growth. The substance seemed to act by inhibiting the root growth and promoting the differentiation of green sprouts. The optimal concentrations were 1~3 mg/l.

These results showed that this new natural growth-regulating substance had an evident physiological regulatory activity on the growth and differentiation of callus tissues from rice pollens.

AUTHOR: LIU Shicheng [0491 1597 2052]
JIN Dexiang [6855 1795 4382]

ORG: Both of the Department of Biology

TITLE: "Notes on Some New Species and New Records of Diatoms from the Strait of Taiwan (Fujian Coast), China. IV. Mastogloia, Nitzschia, Frustulia and Others"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM, NATURAL SCIENCE EDITION] in Chinese Vol 19 No 2, 1980 pp 110-117

EXCERPT FROM ENGLISH ABSTRACT: Eight new species and new varieties of diatoms of Mastogloia, Nitzschia, Frustulia and others were found in the Strait of Taiwan, China. Some of them are:
1. Mastogloia fascistriata Liu et Chin, var. nov.
2. Mastogloia braunii var. constricta Liu et Chin, var. nov.
3. Mastogloia smithii var. excentrica Liu et Chin, var. nov.
4. Nitzschia didyma Liu et Chin, sp. nov.
5. Nitzschia majuscula var. lineata Liu et Chin, var. nov.

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CSO: 4009

AUTHOR: SU Yusong [5685 5148 1529]
SU Zhiqing [5685 1807 3237]

ORG: Both of Shandong College of Oceanology

TITLE: "A Study on Prediction Methods by Using the Empirical Orthogonal Function in Consideration of the Influence Factors"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 189-203

TEXT OF ENGLISH ABSTRACT: The prediction equations formulated in the existing prediction methods by using the empirical orthogonal function are generally based upon field resolution according to the statistical relation among the predictands. The influence of external factors is seldom to be considered. The present paper attempts to introduce the influence factors into the empirical orthogonal prediction method. There are five different approaches to be proposed for this purpose, of which the field prediction method with optimum factors is studied with emphasis. In this method we consider not only the internal correlation among the predictands but also the influence of external factors, and the optimal prediction equation suitable for predicting both values and

[Continuation of HAIYANG YU HUZHAO Vol 11 No 3, Jul 80 pp 189-203]

grades may be formulated by the selected optimum factors from the combinational factors.

The concept of weighting correlation coefficient is suggested here. The obvious difference between it and other correlation coefficients is that the former has the field character. Several practical examples corresponding to the previously mentioned prediction methods are also presented in this paper.

AUTHOR: CAI Aizhi [5509 1947 2535]

ORG: Institute of Oceanology, Chinese Academy of Sciences

TITLE: "Development of the Accumulational Geomorphology of the Spits Diaolongzui"*

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 204-210

TEXT OF ENGLISH ABSTRACT: Diaolongzui lies in the center of the eastern coast of Laizhou Bay. In the coastal plain there is an old coastline. There are many data revealing this old coastline: 1. the 5 m isometric line is a continuous, distinctive cliff, with a relative height of 1-2 meters; 2. Over the cliff is a slight slope consisting of a Q_3^{dpl} yellow stratum. On the Q_3^{dpl} slope, neither feature of marine erosion nor tract of marine accumulation is showing; 3. Below the old cliff is a Q_4^{m} mixture of sands, conches and muds.

Conditions under which the multi-accumulation spits were formed are as follows: A great bulk of the sands supplied from the Wanghe River, some supplied from the eastern coast of the Laizhou Bay, and the carrying by the wave and longshore current to the southwest.

[Continuation of HAIYANG YU HUZHAO Vol 11 No 3, Jul 80 pp 204-210]

Accumulational forms ① - ⑨ are developed in sequence. Behind each form there is a lagoon or marsh. After form ⑥ was developed, form ④ underwent a process of retreat from ④ to ⑤.

On the formation of a small barrier island, we favored Hoyt's hypothesis that the small barrier island may have been formed by spit growth across a lagoon and subsequent truncation of the spit during storms. For example: a. Form ⑧ was truncated by a storm into a small inlet and island 42 years ago; b. The smallest spit ⑦ was truncated into a smaller inlet and island in February, 1979, by a strong northern wind.

* Contribution No 530 from the Institute of Oceanology, Chinese Academy of Sciences.

AUTHOR: ZHOU Zhide [0719 1807 1795]

ORG: Institute of Hydraulic Research, the Huanghe River Conservancy Commission

TITLE: "The Development of the Coastline of the Huanghe River Delta and its Effects on the Upstream Channels"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 211-219

TEXT OF ENGLISH ABSTRACT: As there are 1200 million tons of sediment transported into the sea annually, the deltaic development at the estuary of the Huanghe River (Yellow River) has its peculiarities, very different from those at other estuaries. Very large spits are formed at the river mouth. According to the growth conditions of the spits and the entire deltaic coastline, the deltaic development may be divided into cycles and subcycles, each cycle including several subcycles. In this paper the problems of how to divide the cycles of the modern Huanghe River delta and of the mode of the modern deltaic coastline development and its effects on the upstream channels are discussed.

AUTHOR: ZHANG Zhengbin [1728 2973 2430]
YUAN Hanxiang [5913 3352 4382]

ORG: ZHANG of the Department of Oceanological Chemistry, Shandong College of Oceanology; YUAN of the Research Institute of Seawater Utilization, Qingdao

TITLE: "An Infrared Spectrometric Study of the Reaction Mechanism of Uranium (VI) with the Hydrous Titanium Oxide in Seawater"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 220-228

TEXT OF ENGLISH ABSTRACT: In the present article an infrared spectrometric study of the reaction mechanism of uranium (VI) with hydrous titanium oxide in seawater has been made, with results as follows:
1. Our study of the reaction mechanism of uranium with hydrous titanium oxide in seawater was made under the following three different conditions:
(1) Under conditions of natural seawater; the relationship between the amount of uranium exchanged by hydrous titanium oxide and the duration of water flow has been studied, the results obtained being shown in Figure 1.
(2) Under conditions of set different concentrations of seawater; the results obtained are shown in Figures 2 to 5.
(3) The influence of magnetic field on the reaction of uranium with results as

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shown in Figure 6.
2. The changes undergone by infrared spectrograms under the above three sets of conditions have been studied and a comparison of these spectrograms made, conducive to the exploration of the regularity of infrared spectrographic changes during the process of reaction between uranium (VI) with hydrous titanium oxide. The regularity of infrared spectrographic changes and the quantity of uranium exchanged by hydrous titanium oxide correspond with each other.

On the basis of experiments made in this article, explanations have been given for the absorption bands of infrared spectrograms.

3. A direct experimental basis is offered to the study of the reaction mechanism of uranium (VI) with hydrous titanium oxide by the regularity of changes of infrared spectrograms. The results are in agreement with those obtained by using the pH method, viz. (1) Under conditions of concentrated seawater, UO_2^{2+} and the H^+ of OH base on the surface of hydrous titanium oxide undergo cation ion exchange; (2) Under conditions of natural seawater (including conditions with and without the effect of magnetic field respectively); the study by means of "complexation-dewater" reaction or by cation ion exchange reaction mechanism may be possible.

AUTHOR: JI Minghou [4764 2494 0186]
PU Shuzhu [5543 3219 3796]
JI Xiangli [4764 4382 4409]

ORG: All of the Institute of Oceanology, Chinese Academy of Sciences

TITLE: "Studies on the Initial Products of ^{14}C Metabolism in *Laminaria japonica*"*

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 229-240

TEXT OF ENGLISH ABSTRACT: We carried out photosynthetic experiments from 1 hr to 12 hrs with cultivated *Laminaria japonica* frond in $^{14}CO_2$ gas, in $NaH^{14}CO_3$-containing seawater, and in $^{14}CO_2$-containing seawater, and studied the distribution of alcohol soluble compounds in EtOH extractives and of sugars in the acid hydrolyzates using paper chromatographic and autoradiographic methods.

The radioactivities in alcohol soluble fractions in the case of both $^{14}CO_2$ gas and $NaH^{14}CO_3$-containing seawater in general increased with the time of illumination. As shown in 1963's experiments, the radioactivities in two cases after 12 hours of illumination were seven and five times greater than those after 1 hr of illumination respectively. The radioactivities in *Laminaria* residue after

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alcoholic extraction also increased with the time of illumination. The paper chromatograms of alcohol soluble fractions in the case of $^{14}CO_2$ gas showed the presence of free amino acids, such as Asp, Ala, Glu, Pro, Val and mannitol, in the 1963's experiments, and with the addition of Tyr, Leu and Ile in 1964's experiments. The order of radioactivity in chromatograms generally was: mannitol > Asp > Ala > Glu. In addition to these, radioactive Val, Ile and some unknown compounds also appeared. The radioactivity of mannitol was 92-94 percent and 59-87 percent of the total found in EtOH extracts in 1963 and 1964 respectively. Apart from a small amount of radioactive mannitol, almost no radioactivity was found in other chromatograms in the case of 6 hr illumination in $NaH^{14}CO_3$-containing seawater, and even after 12 hrs illumination it still showed only little radioactivity in mannitol, Asp and Ala.

The paper chromatograms of sugars in hydrolyzate of *Laminaria* residue showed that no ^{14}C was incorporated into them, and a considerable amount of radioactivity still remained near the original spot in 1963's experiments. But from 1964's experiments it was apparent that some ^{14}C was incorporated into mannuronolactone and other uronic acids according to the pattern of paper chromatograms of Linkers et al. The acid hydrolyzate of hot water extractive from *Laminaria* also gave radioactivities in the chromatograms corresponding to fucose and

[Continuation of HAIYANG YU HUZHAO Vol 11 No 3, Jul 80 pp 229-240]

xylose in 1964's experiments.

* Contribution No 560 from the Institute of Oceanology, Chinese Academy of Sciences.

AUTHOR: ZHAO Changchun [6392 7022 2504]
TAN Yujun [6223 3768 6874]
SHI Zhengfeng [2457 2973 1496]
WANG Yiqiang [3769 5030 1730]
YANG Yejin [2799 5509 6855]

ORG: ZHAO, TAN, SHI and WANG all of Shanghai Fisheries College; YANG of Fujian Fisheries Institute

TITLE: "The Possibility of Resuming the Reproductive Capacity in Spawned Eels"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 241-246

TEXT OF ENGLISH ABSTRACT: The gravid eels, after spawning by artificial measures, were reared in freshwater and seawater of a salinity of 24-30 percent respectively. It was found that in both cases the spawned eels gradually resumed their appetites and were kept alive for a long time. After two years the corporeal condition was recivered to a state of commencing the descending migration to the sea. Histological examination of the various regions of the alimentary canal was made and showed it to be quite normal. The ovary was investigated histologically and a large number of oocytes in phases II and III were developed. All these facts lead us to infer that in the natural condition, spawned eels would stay alive and retain their reproductive capacity.

AUTHOR: CHEN Mu [7115 2606]
WU Baoling [0702 1405 6845]

ORG: CHEN of Fujian Institute of Fishery Science; WU of the Institute of Oceanology, Chinese Academy of Sciences

TITLE: "Two New Species of the Genus Hydroides (Polychaeta, Serpulidae)"*

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 247-250

EXCERPT FROM ENGLISH ABSTRACT: While working on the Serpulidae, two new species of Hydroides were found in the shallow depths of the South China Sea. The description of the two new species are given in this article.

* Contribution No 561 from the Institute of Oceanology, Chinese Academy of Sciences.

AUTHOR: ZHANG Jianying [1728 0494 5391]
LI Guoliang [476. 0948 5328]

ORG: ZHANG of the Department of Biology, South China Teachers' College, Guangzhou; LI of the Department of Fisheries, Central China Agricultural College, Wuhan

TITLE: "Monogenetic Trematodes of Freshwater Fishes: Two Additional *Dactylogyrus* from Abramidinae"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 251-254

EXCERPT FROM ENGLISH ABSTRACT: Two additional species of *Dactylogyrus*, *D. magnolium* sp. nov. and *D. flexiformis* sp. nov., are reported respectively for *Toxabramis swinbomis* and *Rasborinus lineatus* from Wuhan and Guangzhou, China.

AUTHOR: QIU Shuyan [8002 2579 7108]

ORG: Department of Oceanography, University of Xiamen

TITLE: "On the Nematocyst-Bearing Ctenophore *Euchlora rubra* Kolliker from Xiamen Harbor"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 255-258

TEXT OF ENGLISH ABSTRACT: On 6 August 1961, a rare nematocyst-bearing ctenophore *Euchlora rubra* Kolliker was collected from Xiamen Harbor by the author. Later, from October 1961 to September 1963, more specimens were obtained. The present paper gives a description of the morphology and living habits of the animal; its phylogenetic relationship with other ctenophores is also discussed.

AUTHOR: WANG Zhenrui [3769 5394 3843]

ORG: Institute of Oceanology, Chinese Academy of Sciences

TITLE: "Study on Chinese Species of the Family Pectinidae (Mollusca Bivalvia) I. A New Species of the Subfamily Propeamussiinae"*

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 259-262

EXCERPT FROM ENGLISH ABSTRACT: The present study is based mainly on the collection of Propeamussiinae from the East and South China Sea by the Institute of Oceanology, Chinese Academy of Sciences, during 1959-1978. There are two species. One is Bathyamussium jeffreysi (Smith), which is first recorded from our seas and tends to occur in deeper waters. The other, Crenamussium sinensis, is a new species.

* Contribution No 564 from the Institute of Oceanology, Chinese Academy of Sciences.

AUTHOR: LIN Guangyu [2621 0342 1342]

ORG: Institute of Oceanology, Chinese Academy of Sciences

TITLE: "A New Genus and Species of Ringiculidae"*

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 263-266

EXCERPT FROM ENGLISH ABSTRACT: In October, 1951, the Institute of Oceanology, Chinese Academy of Sciences, carried out an investigation on the molluscan fauna of the intertidal zone of Tanggu, Hebei Province, China. Of the specimens collected, a shell-bearing Opisthobranchia was found to be a new species representing a new genus of the'family Ringiculidae Meeke, 1864.

* Contribution No 562 from the Institute of Oceanology, Chinese Academy of Sciences.

AUTHOR: ZHANG Junfu [1728 1498 3940]
XIA Bangmei [1115 6721 5019]

ORG: Both of the Institute of Oceanology, Chinese Academy of Sciences

TITLE: "Two New Species of *Laurencia* from the Xisha Islands, Guangdong Province, China"[*]

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 267-274

EXCERPTS FROM ENGLISH ABSTRACT: In the studies of the species of marine red algae from the Xisha Islands, Guangdong Province, China, two interesting red algae are included. After morphological observations, we came to the conclusion that these algae are two new species of *Laurencia*. The type specimens of the new species are deposited in the Herbarium of the Institute of Oceanology, Chinese Academy of Sciences.

[*] Contribution No 566 from the Institute of Oceanology, Chinese Academy of Sciences.

AUTHOR: CHEN Hongda [7115 3163 6671]

ORG: Institute of Hydrobiology, Chinese Academy of Sciences

TITLE: "Structure and Dynamics of Macrophyte Communities in Lake Donghu, Wuhan"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 275-284

TEXT OF ENGLISH ABSTRACT: Lake Donghu, a shallow lake covering an area of 28.5 km^2, is situated in Wuhan city, Hubei Province. Investigation of the structure of macrophyte communities in the lake were carried out during 1962-1964, while the observations on the community dynamics were undertaken in the period of 1972-1978.

In light of some of the methods adopted in the study of terrestrial plant communities, the basal characteristics of macrophyte communities in the lake were described and analyzed. These characteristics have been: the dominant species composition, community classification, distribution of associations, zonation, stratification, frequency, biomass, coverage and periodicity, etc.

The greatest change of community structure in most parts of the lake was the

[Continuation of HAIYANG YU HUZHAO Vol 11 No 3, Jul 80 pp 275-284]

destruction of Potamogeton maackianus. In the 60's Potamogeton maackianus ranked first among the dominant species in the lake, yet it was completely destroyed in the 70's mainly because of over-stocking of grass carp. Nevertheless, when most of the stocked grass carp had been harvested, Najas major, Myriophyllum spicatum and Vallisneria spiralis made a fair recovery, but Potamogeton maackianus has not yet reappeared.

Based upon the viewpoint of limnological ecosystems, this paper emphasizes the importance of the protection of the aquatic macrophyte communities.

AUTHOR: CHEN Zhuohua [7115 3504 5478]
ZHOU Zhenying [0719 6297 5391]

ORG: Both of the Department of Biology, Fujian Normal University

TITLE: "A New Species of Temnogametum from Fujian Province"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 3, Jul 80 pp 285-286

TEXT OF ENGLISH ABSTRACT: Temnogametum fujianense Chen & Zhou, sp. nov.

This new species of Temnogametum was collected from Gushan Mountain, Fujian, China. It is characterized by having purple cell-sap, with the diameter of its vegetative cells varying from 10-14 μ, and the length varying from 72-256 μ, each with a single, axile, plate-like chromatophore, bearing 5-12 pyrenoids, arranged in a single row. Conjugation is mainly scalariform (rarely lateral). Zygospore is compressed quadrangular, with distinct sigmoid "riss-linie" in zygospore wall.

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CSO: 4009

AUTHOR: MA Zuozhang [7456 0146 3864]
HUANG Menhao [7806 1322 3185]
XIAO Xi [5135 3356]
GAO Xianzhi [7559 2009 2535]

ORG: None

TITLE: "The Effect of the Anti-Vibration Cave on Reducing Ship's Vibration"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 1-14

TEXT OF ENGLISH ABSTRACT: The stern vibration excited by the propeller is a thorny question for the ship designers and owners. Based on the active vibration isolation principle, the structural model tests have been carried out and the possibility of reducing stern vibration by use of the anti-vibration cave for high powered ships is demonstrated. The results of ship model towing tests indicate that the influence of anti-vibration cave on ship resistance is slight. The actual ship experimental results also show that this measurement is effective and satisfactory.

AUTHOR: QIN Shiyuan [4440 1102 0337]
HU Yuda [5170 3022 6671]

ORG: None

TITLE: "An Investigation on the Determination of Optimal Structural Dimensions of a Simple Supported Box Girder and a Propeller-Shaft Key"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 15-22

TEXT OF ENGLISH ABSTRACT: The SCDD method and its computer program are given in references [1] and [2]. This paper deals with the two-dimensional optimum structural design of a simple supported box girder by SCDD method and SUMT method and also the determination of optimal dimensions of a propeller-shaft key by SCDD method. The results are discussed.

AUTHOR: ZHANG Jinming [1728 6855 6900]

ORG: None

TITLE: "Mathematical Design of Ship Surface and Surface's Fairness in Three Directions"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 23-38

TEXT OF ENGLISH ABSTRACT: The fairness of ship surface is important in designing and building a ship body. This article describes the method with typical sections which discuss some conditions for its fairness. This method enables the designer to get a ship surface with fairness in three directions and to provide a good condition for ship building. The ship designer can flexibly adjust ship form parameters and change ship form.

In this article ship section area curve, buttock line and diagonal line are also discussed.

AUTHOR: FU Zhifang [0265 1807 2455]

ORG: None

TITLE: "Determination of Vibration Amplitudes and Vibration Stresses of Blades with the Use of Laser Holography Techniques and Finite Element Method"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 39-52

TEXT OF ENGLISH ABSTRACT: A new method of determination of the distribution of vibration amplitudes and vibration stresses of gas turbine compressor blades is represented in this paper. This method makes use of the holography techniques together with the finite element method. The three-dimensional field of vibration displacement is calculated according to the number of interference fringes at every point of the blade and the field of the vibration stress is calculated by the field of vibration displacement. In comparison with the ordinary electrical strain gauge method of measurement, the present method has advantages, particularly for high order vibration modes.

AUTHOR: ZHANG Jiaxiang [1728 0857 4382]

ORG: None

TITLE: "The Application of Generalized Eigenvalue and Eigenvector in the Calculation of Transient Oscillations in Power Transformer Windings"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 53-72

TEXT OF ENGLISH ABSTRACT: This paper presents a method of calculating transient oscillations in power transformer windings during the impulse test. The differential equations for the equivalent network are formulated using the cut-set method in network analysis. With the application of the source transformation and of the matrix partitioning, the differential equations can be expressed in simple form, i.e., $Cq\ddot{U}t + \Gamma qUt = g(t)$. The interpretation of the coefficient matrices is straightforward. Based on the fact that the coefficient matrices are positive definite matrices, the differential equations are evaluated by finding the generalized eigenvalues and eigenvectors of these matrices, so as to raise the speed of calculation. The corresponding amplitudes and frequencies of the harmonic components are given. A comparison is made between the calculated values and the measured ones.

AUTHOR: WU Weicong [0702 4850 5115]

ORG: None

TITLE: "Signal Detecting and Image Processing"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 73-80

TEXT OF ENGLISH ABSTRACT: The detecting of underwater acoustic waves by means of photographic technique is becoming attractive as the image can be processed by electronic computer or optical equipment so as to increase the sensitivity of detection. The underwater acoustic signals can be converted directly into visible images. As each pixel of the image is a two-dimensional function, it has more eigen information than is obtained by using a general pizoelectric transducer which usually gives information of one-dimensional function only. Therefore, it is advantageous to the increase of the signal-to-noise ratio.

In the experiment described in this paper, a spatial filter is used for processing the image of the signal waves and the enhancement of the image is accomplished by computer. The processed image is photographed as shown.

AUTHOR: MIAO Minqiang [4924 3046 1730]

ORG: None

TITLE: "A Discussion on the Resolution of the Panoramic Receiver"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 81-96

TEXT OF ENGLISH ABSTRACT: Resolution is an important criterion of a panoramic receiver. In this paper, the definition of the resolution, the static and dynamic resolution, and the computation method of resolution under some conditions are discussed. A general formula has been derived. This formula indicates that the resolution of the panoramic receiver is proportional to its bandwidth, and the factor of proportionality ζ depends upon the type of the IF filter and the detector. The values of ζ are given for different conditions.

All the results in this paper are also compatible with the spectrum analyzer.

AUTHOR: YU Shangzhi [0205 1424 4249]
JIANG Huanzhong [1203 3562 0022]
TANG Yimin [0781 6654 3046]
ZHU Zhengxing [2612 2973 5887]

ORG: None

TITLE: "Study and Application of Semiautomatic Underwater Arc Cutting in the Deep Sea Using a Consumable Electrode Water Jet Technique"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 97-110

TEXT OF ENGLISH ABSTRACT: Based on the instantaneous photographs of a moving arc taken during underwater cutting and oscillograms of arc current and voltage, this paper analyzes the characteristics of the burning of arcs in consumable electrode water jet semiautomatic underwater cutting, studies its mechanism and advances the hypothesis that there may exist a high temperature "gas cavity" during continuous steady cutting.

This paper also deals with the requirements to the power supplies for cutting and discusses the most important problems in developing cutting apparatus. The relationship between different standard parameters has been obtained

[Continuation of SHANGHAI JIAOTONG DAXUE XUEBAO No 2, May 80 pp 97-110]

Dynamic technological experiments carried out in continuous steady cutting conditions.

The performance, characteristics and principal technical parameters of GSZ-800 consumable electrode water jet semiautomatic underwater cutting apparatus are also outlined.

The last part of the paper is a brief account of a successful cutting on the construction site at a depth of 60 meters under water, using a consumable electrode water jet technique with a cutting speed of up to 20 m/h and greater.

AUTHOR: MO Shanxiang [5459 0810 4382]

ORG: None

TITLE: "A Brief Summary of Auxiliary Projection of Two Skew Lines"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 111-130

TEXT OF ENGLISH ABSTRACT: This article first comments on the solution for the problem I, to find the auxiliary projection in which the projected images of two skew lines would be equal in length and parallel, worked out by five professors, and then presents a regular method of solution. The professors' solution was published in the American magazine, ENGINEERING DESIGN GRAPHICS JOURNAL. After the analysis and inductive reasoning in the pictorial drawing with the combination of three oblique rectangular prisms, the space structure of various solutions has been generalized.

It is the new thesis of an Australian professor by the name of Abe Rotenberg that changed "of equal length and parallel" in problem I to "of equal length and not parallel" in problem II. Now, the author is going to present two fundamental solutions of universal significance. First, he is to work out theorem (1) to find the auxiliary projection in which the projected images of

two skew lines would be equal in length; from theorem (1) is derived a "projecting cone" which may be applied to problems I and II. Secondly, he is to work out theorem (2), to make the projection of an irregular tetrahedron symmetrical; theorem (2) shows that the projector with symmetrical form is the surface intersecting line of three projecting cones with common vertex.

Later the author supplements something in this article after reading the solutions of problem II worked out by the four professors and published in the same American magazine. The author points out that professor Robert P. Kelso's solution can only give the answer to the symmetrical form, being a special case of the second fundamental solution discussed in this article. There exist the limitations of proposition in the solution of the other three professors. In the five figures of the last paragraph of this article, the projecting cone is used to show the existence of such limitations and to determine their scope.

AUTHOR: LI Zhengming [2047 2973 6900]

ORG: None

TITLE: "The Real Situation of the Birth of the Law of Inertia"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 131-138

TEXT OF ENGLISH ABSTRACT: This paper clarifies the real situation of the birth of the law of inertia, the basis of mechanics which initiated the modern experimental science. In recent years some works of history of science have stated this topic with wrong expositions. To counter these expositions, the author proposes different opinions and elucidates his own view in this paper.

AUTHOR: AO Zongying [7118 1350 5391]

ORG: None

TITLE: "Probability Interpretation and Determinism Are Inconsistent in Quantum Mechanics"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 2, May 80 pp 139-142

TEXT OF ENGLISH ABSTRACT: On the foundation of quantum mechanics, P. A. M. Dirac has made the speculation several times recently that it is impossible to reintroduce determinism in quantum mechanics if we do not give up some strongly upheld fundamental conceptions. Dirac's speculation will be worked out in this paper. It rigorously proves that if we do not give up the concept of wave-particle duality, in other words, if we do not give up the state superposition principle and the probability interpretation, consequently not giving up the uncertainty relation, it is impossible to reintroduce determinism in quantum mechanics.

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CSO: 4009

Physics

AUTHOR: ZHANG Youwen [1728 1635 2429]

ORG: Shanghai Jiaotong University

TITLE: "Modification of the Sensibility Equations of Various Infrared Systems"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 813-828

TEXT OF ENGLISH ABSTRACT: When the target is a gray body, especially when its temperature is nearly equal to that of circumferential bodies, the target's self-radiation and the circumferential radiation reflected by the target must be considered. Thus, the sensibility equations of various infrared systems have to be modified. According to these modified equations, we can explain some experimental phenomena that cannot be interpreted by the unmodified equations in which only self-radiation is taken into account.

Here we discuss the thermal imaging systems in detail and the effects of the following factors on them. These factors are: the temperature differential, emissivity differential and reflectivity differential of adjacent detecting

[Continuation of WULI XUEBAO Vol 29 No 7, Jul 80 pp 813-828]

elements in the scene and the scanning efficiency, scanning superposition ratio series of parallel arrangement of detector arrays, additional field lens or immersion lens, and so on. Then, we obtain the more complete sensibility equations and the formula of the noise equivalent temperature differential (NETD) for thermal imaging systems. The calculation methods of X_T in NETD are described and the numerical tables of X_T are given.

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TITLE: "Measurement of the Emissivity and Radiation Temperature of Various Room Temperature Materials"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 829-835

TEXT OF ENGLISH ABSTRACT: The emissivity of various room temperature materials may be measured simply by the HD Infrared Low Temperature Radiometer, the results of which are in agreement with those of other articles.

When the radiation temperature of various room temperature materials is measured, it is found that the values obtained are nearly all the same. In order to explain these experimental results, the corresponding formulas are deduced and, in these cases, the reflective radiation must be considered.

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TITLE: "A Model of the Relative Displacement of the d Band in A-15 Superconducting Compounds"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 836-842

TEXT OF ENGLISH ABSTRACT: The characteristics of the crystal field in A_3B-type compounds with A-15 structure are considered, the relative displacements $\Delta E_{\perp}$ between d-electron energy levels for atom A are calculated according to the pair potential model, and an improved RCA energy band model is further suggested based on the LCAO method. By following this approach, the dependence on $\Delta E_{\perp}$ of the superconducting critical temperature of the V_3B compounds is obtained. The theoretical results are in rough agreement with experimental data.

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ZHOU Zifang [0719 1311 5302]
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ZHANG Xixiang [1728 6932 4382]
WU Hangsheng [0702 2635 3932]

ORG: All of the University of Science and Technology of China

TITLE: "An Approximate T_c Formula of Type A Superconductors (II) In the Case of $\mu^* \neq 0$"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 843-849

TEXT OF ENGLISH ABSTRACT: In the present paper, the analyses for the numerical solution of the Eliashberg equation and the T_c formula of Type A superconductor, which were presented in the previous paper of this series, are extended to the case of $\mu^* \neq 0$.

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TITLE: "Low Frequency Internal Friction in Aluminum-Copper Alloys in the Process of Plastic Deformation"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 850-859

TEXT OF ENGLISH ABSTRACT: Low frequency internal friction in the process of plastic deformation of Al-Cu and Al-Mg alloys was measured on a small tensile test machine and a series of internal friction jumps was observed on the internal friction-strain curve. A study was made on the effect of temperature of measurement and some metallurgical factors on these internal friction jumps. Experimental results showed that the range of the temperature of measurement within which these internal friction jumps appeared corresponds to that for the appearance of the serrated stress-strain curves of aluminum-copper alloys. This indicates that these internal friction jumps on the internal friction-strain curves are associated with the process of strain aging occurring in the

[Continuation of WULI XUEBAO Vol 29 No 7, Jul 80 pp 850-859]

process of plastic deformation, i.e., they are originated from the alternate anchoring of dislocations by atmospheres of solute atoms and their subsequent escaping in the course of plastic deformation.

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TITLE: "Morphology of the Copper Precipitates in Silicon Single Crystals"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 860-866

TEXT OF ENGLISH ABSTRACT: In this article, infrared microscopy and etching method were used to study the morphology of the copper precipitates in silicon crystals. It was found that a variety of copper precipitates observed by infrared microscopy consists of precipitated disks laying in $\{110\}$ planes and their morphology bears no relation to the properties of the sample.

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TITLE: "Infrared Absorption of Oxygen in Silicon and Germanium at Low Temperatures"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 867-877

TEXT OF ENGLISH ABSTRACT: Infrared absorption measurements of oxygen in silicon and germanium were made with IR Fourier Transform Spectrometer at temperatures between 6 K and 300 K in the region of 400-4000 cm^{-1}. Resolution was up to 0.5 cm^{-1} when high resolution conditions were adopted.

[Continuation of WULI XUEBAO Vol 29 No 7, Jul 80 pp 867-877]

Detection limit and sources of error on oxygen concentration of silicon and germanium determined by infrared absorption measurement at low temperature were identified. Using a 2 cm thick sample, the lower limit of detectability for oxygen at 20 K is estimated to be 9.6×10^{14} oxygen atom. cm^{-3} and 3.0×10^{14} oxygen atom. cm^{-3} in silicon and germanium respectively. The oxygen concentration of CZ germanium single crystals with different growth conditions was also studied and these results determined by IR measurements have been investigated and discussed by temper-lithium precipitation technique.

Temperature-dependent fine structure of 1106 cm^{-3} absorption band of silicon with different oxygen concentration has been investigated and discussed at temperatures between 6 K and 300 K.

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TITLE: "Transformation Properties of Three Sets of Closed Time Path Green's Functions"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 878-888

TEXT OF ENGLISH ABSTRACT: In this article, we derived the transformations among three sets of closed time path Green's functions and some calculation rules, from which a general definition of arbitrary multipoint retarded and advanced Green's functions follows naturally. Some algebraic identities among multipoint functions have shown to be the consequences of the property $W[J_+,J_-]|_{J_+=J_-=J} = 0$ for the generating functional on the closed time path.

AUTHOR: DU Youwei [6757 2589 3634]
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TITLE: "A Study on Growth Condition of FeOOH (II)"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 889-896

TEXT OF ENGLISH ABSTRACT: The paper describes the condition of forming α-FeOOH in the alkaline solution and the various factors that influence the phase composition.

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TITLE: "The Theory of Resonantly Enhanced Four-Wave Mixing in Absorbing Media"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 897-904

TEXT OF ENGLISH ABSTRACT: In this work, the exact result of the problem of four-wave mixing in resonant absorbing media has been obtained. The effects of the degenerate four-wave mixing in the Nd^{3+}: glass were calculated, the theoretical results agreeing well with the experimental measurement.

AUTHOR: GAO Zhi [7559 2535]
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TITLE: "Analytical Theory of Steady CO Laser"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 905-915

TEXT OF ENGLISH ABSTRACT: In order to predict the characteristics of the CO laser, usually nearly a hundred stiff differential equations must be solved numerically. Thus it is of interest to make an analytical approach to this subject. Starting from the basic governing equations for vibrational-distribution function and radiative intensities, we have deduced the gain-saturation relation of a steady CO laser. We consider the general case in which both homogeneous and inhomogeneous broadening exist simultaneously for the radiative transition. The effects of multilevel cascade emission is elucidated. For two special cases of two-level emission and homogeneous broadening limit, the present results are in agreement with the theories presented by Lacina and Napartovits, respectively.

AUTHOR: ZHOU Yumei [0719 3768 5019]
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TITLE: "Parametric Instabilities with Well Separated Frequencies in Magnetized Plasma"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 916-926

TEXT OF ENGLISH ABSTRACT: A nonlinear dispersion relation is derived for the homogeneous, magnetized plasmas by the conventional "ponderomotive force" method. By using this unified dispersion relation, various parametric instabilities (stimulated anomalous absorptions and scatterings) are discussed. The results are compared with those obtained by other authors in detail. In the validity region of this model ($\omega_{idler} \ll \omega_{pump}$), the results derived by previous authors can be recovered. In addition to obtaining a few instabilities which have not appeared in the literature, we also find that in general:
1. the "dipole approximation" can give the right results for the stimulated anomalous absorption problems, and
2. the magnetic field may enhance the plasma stability.

AUTHOR: YOU Junhan [1429 1498 3352]
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TITLE: "The Cerenkov Line Radiation and the Emission-Line Spectra of QSOs"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 7, Jul 80 pp 927-936

TEXT OF ENGLISH ABSTRACT: The Cerenkov effect in gas medium is discussed. It is pointed out that the relativistic electrons with isotropic distribution of velocity, when moving through a dense gas, will produce the broad atomic emission-lines with a remarkably asymmetric profile, the continuum slope on its long wave side being quite flat and that on the short wave side very steep.

Calculation for the hydrogen atom shows that the width of L_α line may be larger than 60 Å as the gas density reaches $N = 5 \times 10^{20}$ cm^{-3}. According to this radiation mechanism, the emission-line spectra of QSOs can be interpreted satisfactorily.

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CSO: 4009

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TITLE: "Crimping of Acrylic Fibers"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 1-11

TEXT OF ENGLISH ABSTRACT: A method of characterizing crimp and crimp stability by means of a tensile tester sensitive to a fraction of a milligram was described. Conditions of crimping in a stuffing box were studied, especially with reference to the glass transition temperature of acrylic fibers in water.

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1 Mar 80 pp 1-11]

It was discovered that heated-wet acrylic fibers are liable to mechanical damage by squeezing in a stuffing box, causing fibrillation as shown by a number of scanning electron micrographs. It was also found that the crimping properties of the fiber are also strongly influenced by the mechanical handling from the crimping machine, through heat setting, to the drier. Finally, the relation between crimping and processing properties on a carding machine was also studied.

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ORG: YAO and JIANG both of the Shanghai Textile Engineering College; LIU of the Shanghai Woolen Mill No 12

TITLE: "The Effect of Phasing on Twist Level of $\overline{\text{ST}}^2$ Yarns"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 12-20

TEXT OF ENGLISH ABSTRACT: The self-twisting yarn made by passing through two twisting units mounted on one machine, i.e., $\overline{\text{ST}}^2$ yarn, have the advantage of being used directly for knitting without additional twisting process. The theoretical analysis of this type of self-twisting process is rather complex and has not yet been reported.

In this paper, a theoretical approach to analyze the twist distribution in different zones has been attempted and separate differential equations have been derived. In order to relate the mutual action between two consecutive twisting rollers, the idea of yarn phase is introduced in addition to the machine phase

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1, Mar 80 pp 12-20]

between these rollers. The criterion for maximum twist of the yarn produced or its best value can thus be calculated. Experiments on 3-ply self-twist yarn were carried out, and their results seem practically coincidal with theoretical calculations.

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ORG: None

TITLE: "Measurement and Analysis of the Twist Distribution in Cotton OE Yarn Cross Section. Part I: A Study on the OE Yarn Twist Problems"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 21-30

TEXT OF ENGLISH ABSTRACT: This paper is presented as the first part of the basic study on the OE yarn twist problems, with its emphasis focused on the amount and distribution of twist in the cotton OE yarn cross section. A number of large-scale and systematic tests are conducted herein under the various conditions on the amount of twist in the cotton OE yarn cross section by means of a described tracer fiber method. In so doing, the relationships between the number of cotton yarn tex, the twist multiplier in metric system, the centrifugal force of the yarn and the effect of false twist of the funnel, on the one hand, and the amount and distribution of twist in different segments of the OE yarn cross section on the other, have been established. On this basis, a regressive equation of the relations between the four variable factors as mentioned

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1, Mar 80 pp 21-30]

above and the designed twist as well as the practical twist of OE yarns are indicated. With this equation it is possible to find out the practical twist of OE yarns directly from the four factors under the actual spinning conditions and the designed twist of these yarns. At the same time, the standard for proper representation of the OE yarn twist is also obtained by actually measuring the twist in OE yarn cross sections.

This paper is intended to form a foundation for further studies on the measuring device of the OE yarn twist, with a view to accomplishing the instrumentation in production.

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ORG: None

TITLE: "A Theoretical Approach To and Experimental Investigation of Cam-Needle Impact Action"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 31-44

TEXT OF ENGLISH ABSTRACT: Part I The Basic Equations

Some basic equations, which may be used to describe and analyze the impact action of a linear cam on the needle in the whole acting zone, are derived by applying the fundamental theory of vibration of single-degree-of-freedom system, based on the hypotheses for simplifying the important parameter--the transverse stiffness of the needle. In general, the whole acting zone of a linear cam may be divided into:
1. The impact zone, in which the first impact and several re-impacts occur. The peak value of first impact force is equal to the sum of the resistance force to the needle and the amplitude of vibration, which is directly proportional to the velocity, the frequency and the mass of the needle. The re-impact force may be considered from the same point of view as the first impact, but a decrement

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1, Mar 80 pp 31-44]

factor q must be taken into account, which is determined by the initial longitudinal velocity of the needle when it begins to re-impact with the cam. The intermittent time between the impacts is directly proportional to the longitudinal velocity of the needle and inversely proportional to the frictional resistance force.
2. The steady zone. The acting force on the needle in this zone is equal to the sum of the damping and frictional resistance force.

A typical model of the oscillogram of a linear cam acting force on the needle is also given in this paper.

Part II Experiments and Conclusions

A lot of experiments with various kinds of needles, cams and some different velocities have been made for investigating the actual impact action of a linear cam on a needle in the whole acting zone. The results of these experiments show that the basic equations in Part I used to explain the main characteristics of the linear cam impact action on the needle are reliable. Some of the data and photographs obtained in the experiments are illustrated in this paper as examples. Integrating the theoretical analyses with experimental investigations, interesting conclusions on the following items are obtained: typical model of

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1, Mar 80 pp 31-44]

the oscillograms of the linear cam impact action on the needle, the peak value of the first impact force, the acting force in the steady zone, the re-impact force, the intermittent time between the first impact and the re-impact, the effects of the slope of the cam, and the horizontal velocity of the needle on the impact force, etc.

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TITLE: "Carding Force and Carding-Cleaning Action on a Stationary Flat Card"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 45-56

TEXT OF ENGLISH ABSTRACT: The carding forces of stationary flats on a minicard have been studied. A sensor was mounted on the flat being investigated. One or three of this kind of flat were placed on different positions in the working zone. As the strip of fillit clothing mounted on the sensor was as small as 1.1 cm^2, we assume that the carding forces to separate a tuft between the cylinder and flats can be measured. The force was recorded continuously by a light oscillograph.

It is found that the carding action of the flats in the back zone is mainly to open the tufts and that of the flats in the front zone is mainly to manipulate the single fibers and the tufts still remaining on the cylinder.

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1, Mar 80 pp 45-56]

The fiber load on each flat varies with its position in the working zone and the following empirical formula is found to be applicable:

$$S = a \cdot P^b$$

where S: the fiber load on each flat,
P: the total amount of the fibers fed into the card during the running period,
a,b: constants.

The cleaning action of this kind of flat is also investigated and analyzed.

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ORG: None

TITLE: "Electron-Microscopic Examination of the Surface Morphological Structure of the Synthetic Fibers"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 57-62

TEXT OF ENGLISH ABSTRACT: The surface morphology of polyamide fibers, the morphological structure of the crimp region and the fracture morphology of the polyacrylonitrile fibers have been observed by using the transmission electron microscope and the scanning electron microscope. The characteristics of morphological structure of each specimen have been discussed. It is mentioned that if a process of steaming is added between the processes of spinning and stretching, the surface of the polyamide fibers would be rougher, and hence their friction coefficient would be decreased. It was observed that certain polyacrylonitrile fibers had lower molecular binding forces between the fibrils than ordinary polyacrylonitrile fibers, and this caused a marked decrease of the strength of such fibers after the crimping process. Finally, the article deals with the applicability of the two kinds of electron microscopy used in the experiment.

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TITLE: "An Analysis of the Sulzer Loom Gripper"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 63-68

TEXT OF ENGLISH ABSTRACT: The gripper of the sulzer loom (gripper shuttle loom) has a lower fatigue resistance than any other part of the machine. When properly heat-treated, correctly designed critical section of the gripper, and finally strengthened by shot-peening, its fatigue life can be raised from 200-300 thousand up to two million, while a figure of five million cycles or more has been reached in some cases.

Focusing their attention on the effects of stress, the authors have looked into the causes of and approaches to the raising of the fatigue life and made a preliminary analysis which has resulted in the establishment of a fatigue safety coefficient of the said gripper and has illustrated that the fatigue threshold stress intensity range (ΔK th) is raised two-fold, as described in the paper.

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ORG: None

TITLE: "The State-Space Calculation of Concord Brake of the Combined Printing and Dyeing Machine"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 69-74

TEXT OF ENGLISH ABSTRACT: The state space analysis is a recently developed method used to study dynamic states of systems. In this article, the state equation of concord brake of the combined printing and dyeing machine is derived and an example calculated from the above equation is provided.

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GONG Longyao [1362 7893 1031]
ZHU Guanxiao [2612 6034 1321]

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TITLE: "Determination of Sodium Methylallyl Sulfonate in Sodium Thiocyanate Solvent"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 81-87

TEXT OF ENGLISH ABSTRACT: Silver nitrate precipitation method in alkaline medium is adopted in the present paper to prevent interference from CNS^-, S^{2-}, SO_3^{2-}, etc. pH of filtrate is kept below 0.65 in order to avoid the reaction between sodium formate and iodine bromide (IBr). Then the iodine bromide halogenation method is used to determine quantitatively the content of the third monomer, i.e., sodium methylallyl sulfonate (SMAS) in the filtrate.

The method is simple in operation and has good data reproducibility. The NaSCN content in the solvent amounts of 50-52 percent and that of SMAS constitutes

[Continuation of FANGZHI GONGXUEYUAN XUEBAO Vol 6 No 1, Mar 80 pp 81-87]

0.025-0.12 percent, while SMAS recovery ranges between 99.6 and 101.6 percent, with relative error not exceeding ±3 percent. This method is applicable to control analysis in polyacrylonitrile plants.

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TITLE: "A Brief Report of Native Multispindlecup-Type Spinning Frame with Automatic Yarn Count Regulation During Twisting"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 88-90

TEXT OF ENGLISH ABSTRACT: The report deals with the native multispindlecup-type spinning frame created long ago, but currently still in use in the villages of Zhejiang Province. The count of the spun yarn is automatically regulated during twisting by means of a tension device which can be adjusted by adding small weights. The working principles of the frame are quite different from modern spinning machines. It is another example illustrating the creative ability of the Chinese working people long ago. The exact date of the invention of this kind of frame remains to be ascertained.

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TITLE: "Structure and Sizing Properties of Acrylic Size"

SOURCE: Shanghai FANGZHI GONGXUEYUAN XUEBAO [JOURNAL OF SHANGHAI COLLEGE OF TEXTILE TECHNOLOGY] in Chinese Vol 6 No 1, Mar 80 pp 91-100

TEXT OF ENGLISH ABSTRACT: Due to its increasingly wide application, acrylic size has become one of the three principal sizes currently used. However, its quality control is often found as a knotty problem, and the sizing effect unstable.

This paper describes the variability of acrylic size structures and their chemical activities. It is proved by means of infrared absorption spectra that acrylic size is a polymer resulting from copolymerization of several monomers. Some factors relating to sizing properties are discussed and analyzed. Proper control of these factors will promote the stability of sizing liquor, which will make it possible to prepare the required optimum size.

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CSO: 4009

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TITLE: "The Fracture Processes of the Tangshan Earthquake and Its Mechanical Analysis"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 111-129

TEXT OF ENGLISH ABSTRACT: Fault-plane solutions of the mainshock and 17 large aftershocks are computed on the DJS-6 computer from the data of the first motions of P waves. Based on the model of finite moving source, the fracture processes and source parameters of the mainshock and three largest aftershocks

[Continuation of DIZHEN XUEBAO Vol 2 No 2, May 80 pp 111-129]

are estimated. The mainshock occurred on a nearly vertical right-lateral strike-slip fault, striking N 30°E, with an asymmetric bilateral fracture which propagated 70 km northeastward and 45 km southwestward with an average velocity of 2.7 km/sec. Source parameters of the mainshock, such as the average dislocation, seismic moment and stress-drop, are estimated to be 136 cm, 1.24×10^{27} dyne cm and 12 bars respectively.

Most of the aftershocks with $M_L > 5.0$ occurred near the main fault plane and along the fracture branches at both of its ends. These fracture branches are located in the dilatational quarters and make about 80° angles with the main fault plane. On the two fracture branches, most of the major aftershocks are concentrated. A mechanical analysis of this phenomenon of fracture propagation is attempted in this paper.

It is shown that for complex deformations, the fracture propagation no longer takes place along the original plane for brittle materials, but deviates from it by a certain angle. The mechanical model used to calculate this deviation angle of fault yields results which agree essentially with the observation.

Based on the above results, it can be inferred that the characteristics and mechanical conditions of the Tangshan earthquake, as well as those of the

[Continuation of DIZHEN XUEBAO Vol 2 No 2, May 80 pp 111-129]

Haicheng earthquake, are quite different from those of the earthquakes occurring on some great faults which may be explained by stick-slip mechanisms. These two earthquakes are not only caused by the horizontal stress fields, but also by local vertical forces induced from the movement of the underground materials. It is also noteworthy that the Tangshan earthquake differs from the Haicheng earthquake in that it occurs in a relatively homogeneous and brittle medium and therefore no foreshocks took place before the mainshock.

AUTHOR: HUA Xiangwen [5478 4382 2429]

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TITLE: "Stress Variations in the Region Around Beijing and Tianjin Before and After the 1976 Tangshan Earthquake"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 130-146

TEXT OF ENGLISH ABSTRACT: This paper deals with the variations of tectonic stress in the region around Beijing and Tianjin before the great Tangshan earthquake of 1976, based on the analysis of the continuously recorded data of over 400 small earthquakes which occurred during the last 20 years. Such variations are chiefly concerned with the horizontal stress, indicating compression in the east-west direction and extension in the north-south. It is essentially consistent with the results from the earthquake source mechanism solution and the results of field macroscopic observations of the main Tangshan earthquake. The variations lasted for four and one-half years and recovered to the original state after the great earthquake.

Through an analysis of the stress variations, the spatial distribution of the seismic activity of small earthquakes of $M \geqslant 3.0$ occurred in this region and

[Continuation of DIZHEN XUEBAO Vol 2 No 2, May 80 pp 130-146]

their source mechanism solutions, the relation between the stress concentration and the fault activity before the Tangshan earthquake has been discussed. It can be shown that before the earthquake the strain energy was concentrated at the northern end of the Cangdong fault belt and it was released for the first time during the last several decades, which reflects the background for the occurrence of the Tangshan earthquake.

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TITLE: "Directions of Tectonic Stress and Solutions of Earthquake Source Mechanisms"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 147-152

TEXT OF ENGLISH ABSTRACT: The relations among the radiation pattern of seismic waves, focal mechanism solution and the directions of the tectonic stress are investigated with the aid of the results of two-dimensional model experiments. The radiation pattern of seismic waves is dependent on the form of motion of the medium around the focus at the time of the earthquake, which is connected not only with the pre-existing stress before the earthquake but also with other factors, such as the geological conditions within the focal region. Based on the experimental results of rock mechanics as well as the results of

our experiments, it can be assumed that the direction of the principal compressive tectonic stress is closer to the fault plane than the direction of the principal compressive stress of release deduced from the focal mechanism solution.

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TITLE: "Some Features of Earthquake Distribution Around Beijing and Crustal Buckling"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 153-168

TEXT OF ENGLISH ABSTRACT: The large spatial distribution of the activity of strong earthquakes is a characteristic feature. It seems that the worldwide seismic zones are somehow arranged in several regular directions on the spherical surface. We suppose that the cause of earthquakes might be related to the movements of the whole earth.

A feature relating to earthquake activity in blocks, the boundaries of which usually make a 45° angle with the latitude or longitude, was found. The same situation happened before strong earthquakes occurred in recent years. A stripe making an angle of 45° with the latitude or longitude has been delineated. Strong earthquakes occurring in recent years are located essentially along the

[Continuation of DIZHEN XUEBAO Vol 2 No 2, May 80 pp 153-168]

two boundary lines of this stripe, and obviously distribute themselves at an equidistant span, which means that the distance of the span between the strong earthquakes resembles an equal wave length during the folding of geological strata. We have studied all the M 8 earthquakes which have occurred in China throughout history. We have found that before or after each earthquake (M 8), another earthquake (M 7.5) generally occurred at a definite distance away. The distance span has two predominant distributions, one at a shorter distance of 480-550 km, the other at a longer distance of about 1100 km (the latter distance is about twice the former).

For a preliminary discussion we take the buckling process of a simple cylindrical shell under compression in the axial direction. From analysis we know that, when the cylindrical shell buckles, the buckling wave length $\left(\frac{1}{2}\lambda = 1.72\sqrt{Rh}\right.$, was determined only by the radius of the cylinder and the thickness of the shell. Now if we substitute R=6000 km; h=15 km, the halfwave length will be 530 km. It agrees with the distance span for strong earthquake distribution.

Therefore, we have the tentative opinion that the character of earthquake distribution is controlled by crustal buckling.

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TITLE: "Stress Deformation and Tilt Fields of the Earthquake Sources"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 169-185

TEXT OF ENGLISH ABSTRACT: In this paper, from the point of view of the action of horizontal tectonic stress, the author has investigated the stress, deformation and tilt fields of the earthquake sources and derived the formulas to evaluate the seismic moment and magnitude from the vertical deformation data. The results agree with the observational data rather well.

Finally, the seismo-tectonic conditions for the occurrence of strong earthquakes and the credibility and generality of the elastic rebound theory has also been discussed.

AUTHOR: QIAN Fuye [6929 1788 2814]
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TITLE: "Ten Examples of Changes in Earth-Resistivity Prior to Strong Earthquakes"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 186-197

TEXT OF ENGLISH ABSTRACT: In addition to the 1976 Tangshan earthquake, 10 more examples of changes in earth-resistivity (ρ_x) prior to strong earthquakes, five of which had magnitudes $M \geq 6$, are given in this paper. There are always at least two earth-resistivity recording stations located around the epicentral area of each of the earthquakes, recording the changes of ρ_x values quite in accord with each other. For some of the earthquakes, also given are data of repeated base line surveys in the vicinity of some of the earth-resistivity stations for comparison.

In many cases, the earth-resistivity values of the shallow layers below the ground surface decrease prior to the earthquakes, just as in the case of the Tangshan earthquake. However, in a number of cases they increase or vary

[Continuation of DIZHEN XUEBAO Vol 2 No 2, May 80 pp 186-197]

irregularly. The purpose of this paper is merely to provide an accumulation of more such observed phenomena of earth-resistivity changes around epicentral areas before and after strong earthquakes. This is because observations of earth-resistivity changes at stations before and during strong earthquakes are a rare opportunity so far as such observations carried out in earthquake regions of the whole world are concerned, despite the fact that such observed changes in earth-resistivity are restricted to very shallow layers of the ground.

AUTHOR: LUO Guangwei [5012 0342 0251]
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ORG: Both of the Hydrochemistry Group, Seismological Brigade of Beijing*

TITLE: "Experimental Results of Radon and Thorium Emanations from Rock Specimens Under Pressure"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 198-204

TEXT OF ENGLISH ABSTRACT: This paper describes the continuation of the previous laboratory work on the observation of radon and thorium emanations from rock specimens under pressure. The equipment used in the experiment are nearly the same as before. The results show again the previous conclusion that the variation of radon content of underground water as a precursory phenomenon of strong earthquakes is related to the fracturing of rock medium. However, for local regions, the characters of rock fracturing, of rocks themselves and so on are quite different so that the anomalous behavior of the variation of radon content before and after a strong earthquake may be quite different.

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ORG: Seismological Brigade of Beijing

TITLE: "Earth Tides and Seismic Waves Recorded by the Level Fluctuations in a Deep Borehole at Wali Near Beijing"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 205-214

TEXT OF ENGLISH ABSTRACT: The water level in a deep borehole at Wali near Beijing may be used to record the tidal body-strain of the earth. After great earthquakes Rayleigh waves propagate around the earth's surface several times and cause the fluctuations of the water level in this borehole several times. Its high sensitivity in recording earth tides and seismic waves is believed to be due to the particular hydrogeological conditions.

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AUTHOR: HAN Yuanjie [7281 0337 2638]

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TITLE: "Some Relations Between Microbaromic Waves and Earthquakes (A Review)"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 2 No 2, May 80 pp 215-226

TEXT OF ENGLISH ABSTRACT: The long period of crustal movement prior to earthquakes has been noted for a long time. However, the problem of zerodrift of long period seismographs rendered the observations with such seismographs tentative or experimental in nature. In addition, when the underground gas spurts out and is set free before earthquakes, the observation of such gas can be made only near it and not too far away. The microbaromic waves, such as infrasonic and gravity waves caused by the gas outspurts and long period ground movements prior to earthquakes, may be detected at a distance, and thus should be studied.

Infrasound caused by seismic waves has been noticed long ago, but no report on infrasound before earthquakes has been made. After the 1976 Tangshan earthquake, from August 1976 to March 1977, the author observed microbaromic waves prior to aftershocks with a microbarograph at Beijing. More than 10 of these kinds of waves were observed. Their characteristics are as follows: the period is 40-80 seconds, sonic pressure 1-5 microbars, duration lasts a few minutes and they appeared 1-16 hours prior to the earthquakes.

[Continuation of DIZHEN XUEBAO Vol 2 No 2, May 80 pp 215-226]

In this paper, a method of analysis for recognizing microbaromic waves prior to earthquakes is developed. Its possible mechanism and other phenomena have been discussed.

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China Report

SCIENCE AND TECHNOLOGY

No. 59

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CHINA REPORT

SCIENCE AND TECHNOLOGY

No. 59

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PHYSICAL SCIENCES

ANALYSIS FOR MINOR ISOTOPES DEUTERIUM, OXYGEN-18 IN NATURAL WATERS

Beijing KEXUE TONGBAO [SCIENCE BULLETIN] in English Vol 25 No 3, Mar 80
pp 209-212

[Article by Zhang Qinglian [1728 7230 5571]

[Text]

In the past forty-odd years my colleagues and I have carried out four series of experiments on the distribution of hydrogen and oxygen isotopes in various natural waters, and made corresponding investigations on the methods of analyzing these isotopes.

We started with the examination of the density variation of the water from some snow samples collected in North Europe in December, 1935 and found a depletion of heavier isotopes corresponding to a density difference about -4.2γ, where $\gamma = \mu g/ml$[1]. At the same time we measured the vapor pressure ratio of HDO and $H_2{}^{18}O$ vs. H_2O, and established the corresponding formulas for the temperature range from the melting to the boiling point of these isotopic forms of water[2]. These formulas yield a density decrease of -1.6γ for HDO and -2.4γ for $H_2{}^{18}O$ at 0°C, the assumed temperature of evaporation of ocean water in cold winter. Thus, the total depletion is calculated to be -4.0γ, a value agreeing reasonably well with observations.

For the separate determination of the density variation due to the content of HDO and $H_2{}^{18}O$ by the float method, we developed a method for the normalization of deuterium by means of laboratory hydrogen sulfide. A comparative measurement on samples and standards eliminated systematic errors.

With data then known on the abundance of deuterium and oxygen-18 in various species of natural water, chiefly snow, rain, land water, ocean water, crystal water of minerals, plant and animal water, we were able to sketch in 1936 the first figure for the cycle of the isotopic forms of water on the earth[3].

In 1958—59, in a survey of the natural waters in China, we collected about 50 samples, which were grouped as waters from sea, river, underground, spring, hot spring, lake, plateau lake, salt lake and oil brine. The result of analysis showed that the waters of salt lake and oil brine were considerably enriched with heavier isotopes[4]. Only a few samples were separately analyzed for deuterium and oxygen-18 after normalization with laboratory carbon dioxide. This known method was bettered by means of a parallel arrangement for the reference water and the sample to be measured so as to eliminate systematic errors(5).

A third series of measurements were undertaken in our laboratory after we had collected, in 1966 and 1968, ice, snow and water samples in the region north of Mt. Zhumulangma at altitudes from 4.5 to 7 km. Nineteen different samples were grouped as glacial ice, pack snow, river and lake, lake on glacier, soaked ice, and spring water. In all the waters investigated, the contents of deuterium and oxygen-18 were lower than those in standard mean ocean water, SMOW. In general, deuterium was comparatively less depleted in the solid than in the liquid phase. With regard to isotopic altitude effect, age effect, profile isotopic composition and isotopic composition in a plateau lake, the data observed were in conformity with the enviromental factors(6).

In connection with this investigation, we improved the method of normalizing the oxygen isotopes with purified tank oxygen with manganese dioxide as catalyst at 600°C. Oxygen was conducted under pressure through a saturator containing the water sample at 60°C. The gas mixture after the equilibration was chilled with a trap for the recovery of water. The saturator and trap took exactly the same form and could function alternately by suitable adjustment of clamps. Thus, a succeeding procedure could be carried out in the reverse order, and would suffice for a comparative analysis of the sample and the reference water.

On the other hand, we developed in the sixties a temperature-pressure float method, in which a 16 mm spindle-shaped borosilicate glass float was situated in a 2.5 ml chamber with a conical bottom for centering the float. The chamber was closed with a ground glass stopper with capillary tubing to accommodate the expansion of water. The top of the chamber had an upper extension as the body of flotation tube, which after the degassing of the sample would again contain the re-admitted air, that could nevertheless diffuse no more into the chamber during the measurement. With a thermostat constant to ± 0.001°C, an accuracy of $\pm 0.2\,\gamma$ was readily obtainable.

The fourth series of measurements followed the second ascent from the north slope to the summit of Mt. Zhumulangma in the summer of 1975. Ten samples of snow and ice were collected by the mountaineers at altitudes from 7050 m at the North Col up to the summit, which at an altitude of 8848 m is the pinnacle of the entire earth crust. The locations of these samples are shown in Fig. 1. Five samples from the North Col represented a profile of small depth.

Deuterium was determined with a mass spectrometer of Model M-86, while oxygen-17 as well as -18, with that of Model MAT-CH5. The former instrument was calibrated with hydrogen gas converted from water samples prepared from waters containing 1.05 ± 0.04 ppm D and 99.710 ± 0.013 atom% D.

Methods for the conversion of water samples into inlet gases of hydrogen and oxygen were worked out(7). Water was decomposed at 550°C by pure magnesium filings which were previously degassed in high vacuum at about the same temperature, since the metal occluded deuterium at a higher concentration than that in ordinary

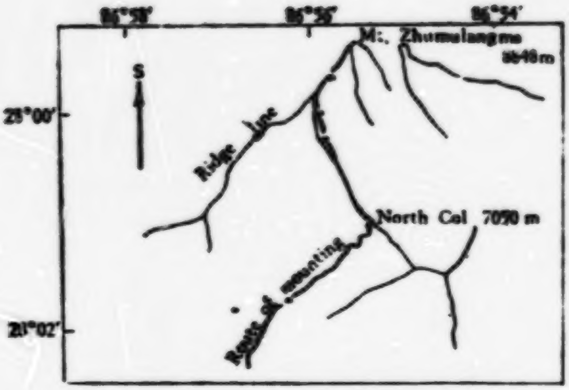

Fig. 1. Four locations of sampling being indicated by the camps from the North Col upward, one between the lowest two of them, and another at the summit.

water. Thus, we could accurately analyze the sample of snow collected from the summit on May 27, 1975, the deuterium content of which was 123.2 ppm, or $\delta D(‰) = -208.8$. These two values, being separately determined, are in conformity with the experimental result of Hagemann et al. for the atomic ratio of D/H in SMOW(8).

The conversion of water sample into inlet oxygen gas was effected by electrolysis on a pure gold anode in 16 ml of a 0.1 *M* sodium fluoride solution at 20°C. Small fractions of oxygen gas, each being produced by a current of 250 mA for 9 min, were collected after removal of water vapor with trap. The first 4 portions were discarded, since they might be contaminated with residual dissolved air, although the cell was filled with nitrogen before the electrolyte was syringed. The following 7 samples were analysed mass-spectrometrically with an electron emitter made of a pure rhenium strip 0.04 mm thick, 0.7 mm wide and 7 mm long. With an ignition current of 600 μA, it could work for 200 hr(9). The pressure of oxygen in the ionization chamber was 2×10^{-6} torr, while the ion current of mass 32 amounted to 2×10^{-9} A. By means of alternate operation on the sample and the standard, and the service of a cup-cup double collector, the masses 32 and 34 were recorded on a compensograph. By the way, we determined the separation factor of ^{18}O on gold anode as 1.0076, while the known value in related literature is 1.0094. The mass 33 was measured by re-adjusting the cup position. After correction was made for the bias of the instrument, the δ value was obtained from the mass current ratio.

For the summit snow, $\delta^{18}O(‰) = -26.99$, corresponding to the ^{18}O content of 1946.5 ppm according to the new determination made by Baertsch for the $^{18}O/^{16}O$ ratio in SMOW(10).

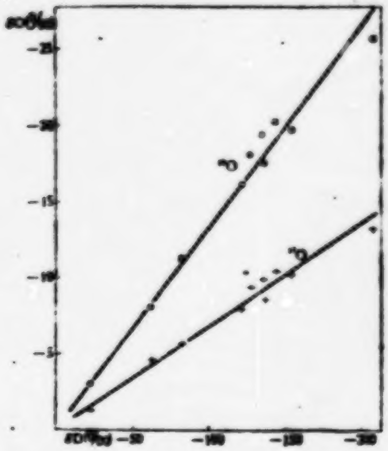

Fig. 2. A plot of δ^{17}O and δ^{18}O vs. δD of snow and ice at altitudes from 7050 up to 8848 m.

Table 1

δD, δ^{17}O and δ^{18}O of the Snow and Ice at Altitudes From 7 km up to the Summit

Altitude (m)	Precipitation	Date (1975)	δD (‰)	δ^{17}O(‰)	δ^{18}O(‰)
8848	New snow	27/5	−208.8	−13.82	−26.99
8600	Surface snow	ca. 25/5	−186.2	− 9.17	−18.79
8100	Granular snow	20/4	− 82.2	− 6.23	−12.57
7600	Ice	ca. 20/4	− 22.3	− 1.86	− 4.31
7450	Granular snow	21/4	− 62.0	− 5.25	− 9.43
7050	New snow	22/3	−127.7	− 9.97	−19.37
7050	Old snow	22/3	−135.8	−10.50	−20.72
7050	Granular snow	22/3	−144.1	−11.07	−21.60
7050	Pack snow	22/3	−121.7	− 8.53	−17.48
7050	Ice	22/3	−154.7	−10.83	−20.99

The overall results of analysis are shown in Table 1, where we express the data conventionally as δ(‰) with SMOW as reference. The corresponding data appearing in a previous article[11] have been re-calculated. One notices that all δ's were negative. Fig. 2 shows a plot of δ^{17}O and δ^{18}O vs. δD. The following formulas hold approximately:

$$\delta D = 14.5\,\delta^{17}O, \qquad \delta D = 7.0\,\delta^{18}O.$$

Such ratios between δ's conform with those calculated from the vapor pressure formulas at a temperature about 30°C, which seems to be too high. Furthermore, the maximum depletions observed were about twice as large as those resulting from a single process of evaporation, therefore secondary processes must have occurred.

In recent years we have been interested in preparing some reference samples for deuterium, oxygen-18 and other light isotopes. For example, we possess a reference sample of untreated Beijing University tap water BU76, collected on January 8, 1976. It has a deuterium content of 145.7 ± 0.3 ppm D, and $\delta^{18}O = -9.09‰$. Besides, we collected altogether 12 samples, one each month around the 20th from January to December in the year of 1978. The untreated tap water was analyzed with the MAT-CH5 instrument by the carbon dioxide equilibration method. The oxygen-18 content was found to be constant within an experimental error of ± 0.2‰. For this equilibration method, it is important to determine accurately the exchange equilibrium constant for ^{18}O at 25°C, the best value of which known up to date is 1.0412 ± 0.0001, reported by O'Neil et al.[12]. We have checked this value by experiment, and the value we found is 1.0411 ± 0.0002 at 25°C[13].

For the conversion of water samples into inlet gas hydrogen, we obtained good results with the uranium decomposition method devised by Bigeleisen[14]; working with a mass spectrometer of Model MM-602D, we achieved an accuracy of 1‰ for δD. On the other hand, the BrF_5 method of converting water into inlet gas oxygen described by Clayton et al.[15] was tested, and our experimental errors were within 0.2‰ for $\delta^{18}O$.

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CSO: 4020

CHINA'S FIRST KARST GEOLOGY INSTITUTE ESTABLISHED IN GUILIN

Beijing GUANGMING RIBAO in Chinese 5 Aug 80 p 1

[Article by Wei Zhimin [7614 1807 3046]]

[Text] After 3 years of planning, the building of the Institute of Karst Geology of the Ministry of Geology, China's first national organization specializing in the research of karst topography and located in Guilin City, is almost complete, aside from the museum of karst geology, which is included in the basic construction work.

China is a country rich in limestone-carbonate rocks and has extensive areas of karst topography distribution. According to preliminary statistics, the area of distribution of exposed carbonate rocks reaches 1,200,000 km^2, amounting to about one-eighth of the area of the country; if the covered and buried karst areas are included, the total would be more than 2,000,000 km^2, about one-fifth of the area of the country. In national economic construction, such as hydroelectric projects, road building and repair, mining and mine construction, industrial, mining, and agricultural water supplies, industrial, civilian, and defense construction projects, etc.; therefore, many complex problems of karst topography are often encountered and in need of resolution. At present, China's research work on karst is still a great distance from satisfying the urgent needs of industrial and agricultural production. For the purpose of strengthening the study of karst geology, the state resolved to build an institute of karst geology in Guilin where the types of karst topography, and their morphology are both typical and complete, for the purpose of "developing studies on the principle of karst development and its utilization and reconstruction." This subject has been listed as one of the key items in the national science and technology development plan outline, 1978-1985. This research institute will emphasize both the basic theoretical study and study on the application of karst. Currently, karst hydrology and karst engineering geology will be the major fields of research, while at the same time studies on some karst caverns and karst mineral deposits will be launched.

With respect to karst theory, studies will be carried out primarily on melting and erosion mechanism and theory, the hydrokinetic zoning theory, and the effects of geotectonics, geomorphology, and glacier on the development of karst. Although these studies are aimed at the entire country, the emphasis will be on the southern provinces of karst development. In the past 3 years, while the institute was being constructed, in connection with the key subjects of the national science and technology development plan outline, the major subjects of study have included: the principle of karst development in Guilin-Yangsu and its hydrology and engineering geology, a study on the environmental geology and protection of water resources of Guilin City, principle of development of karst in Luota of Hunan Province, and its utilization and reconstruction, a study on the application of remote sensing technology in karst geology research, etc. Preliminary results have been obtained in all these subjects.

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CSO: 4008

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6248
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AUTHOR: WANG Peilun [3769 0160 4858]

ORG: None

TITLE: "Robustness of Kinescope Glass Shell"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 1-13

TEXT OF ENGLISH ABSTRACT: The problem of robustness of the kinescope glass shell is discussed in detail in this paper. First, the main causes of explosion of the glass shell are analyzed. The author points out that the robustness of the glass shell depends on the distribution of residual stress and that of the structural stress in the shell. Experimental methods for determining the residual stress and structural stress in the glass shell are described. The problem of stress concentration caused by the air bubble in the shell is discussed. A tentative idea of how to use the method of fracture mechanics to study the effect of macroscopic defects of the glass shell is proposed. Finally, the principles of design for preventing explosion of the kinescope glass shell are presented.

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ORG: None

TITLE: "An Experimental Study of ZDB-150 Type Cryogenic Vacuum Pump with Closed-Cycle Refrigerator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 14-22

TEXT OF ENGLISH ABSTRACT: Cryogenic pumping represents the latest method in high and ultra-high vacuum-obtaining techniques. It has the advantages of high pumping speed, freedom from hydrocarbon contamination, and adaptability to a wide range of operating pressures. This paper deals with the design concepts, the actual construction and the main performances of ZDB-150 type cyropump. In the free molecule flow region the pumping speed is greater than 650 l/sec and 1400 l/sec for air and hydrogen respectively. The ultimate pressure is less than 6×10^{-10} torr. The two-stage G-M closed-cycle refrigerator provides 2.5 watts at 15 K for the second stage and 25 watts at 70 K for the first stage. A comparison between the performances of the ZDB-150 cryopump and some other commercial types is listed at the end of this paper.

AUTHOR: HUANG Qiwen [7806 0679 2429]
ZHANG Mingbao [1728 2494 1405]
WANG Zongjing [3769 1350 2417]

ORG: None

TITLE: "Investigation of a Long-Life CO_2 Laser with $CaCO_3$ as Supplier"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 23-28

TEXT OF ENGLISH ABSTRACT: This paper describes the problem of using $CaCO_3$ as a supplier of CO_2 to compensate for its loss by dissociation and thereby to prolong the lifetime of a CO_2 laser. The relation between the equilibrium pressure of $CaCO_3$ and the laser output characteristics is also investigated.

AUTHOR: SHA Yujun [3097 3768 6874]

ORG: None

TITLE: "A General Analytic Method of Solving Mixed Lumped-Distributed Networks"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 29-42

TEXT OF ENGLISH ABSTRACT: In this paper the uniform transmission line is considered as a four-terminal element, and the formula for its Y-parameters against the external circuit is derived. Using these parameters the author suggests a general analytic method of solving the mixed lumped-distributed networks, and a transmission-line transformer is taken as an example of its application. The result thus obtained gives a theoretical explanation of the wideband characteristic of the transmission-line transformer.

AUTHOR: YING Jimin [2019 3444 3046]

ORG: None

TITLE: "A New Approach to the Helix Dispersion Equation for Longitudinal Loading by Radial Vanes"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 43-56

TEXT OF ENGLISH ABSTRACT: This paper gives a new approach to derive the helix dispersion equation for longitudinal loading by radial vanes and also gives the helix dispersion equations for two specific loading structures. The calculated values by this method agree satisfactorily with the experimental results.

AUTHOR: FENG Chunbo [7458 4783 0130]

ORG: None

TITLE: "A Computational Method for Stability Analysis of Linear Control Systems"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 57-61

TEXT OF ENGLISH ABSTRACT: A computational method for stability analysis of linear control systems is presented. The state-variable matrix of a linear system is first transformed into an equivalent upper Hessenberg matrix. This reduction of the system matrix to the Hessenberg form may be achieved by the use of either stabilized elementary matrices or elementary unitary matrices. The upper Hessenberg matrix is then transformed into a Schwarz matrix. The stability of the system is analyzed on the basis of the well-known property of the Schwarz matrix. The suggested method is also useful for computer-aided feedback synthesis of multivariable linear control systems.

AUTHOR: SHI Mingheng [2457 2494 1854]

ORG: None

TITLE: "Differential Equations of Intense Heat and Mass Transfer in Capillary-Porous Medium"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 62-68

TEXT OF ENGLISH ABSTRACT: The study of heat and mass transfer in capillary-porous medium is extended to the case where liquid and vapor are transferred simultaneously. A system of differential equations is set up for this case.

AUTHOR: YIN Kaitai [3009 7030 3141]
WANG Zhong [3069 1813]

ORG: None

TITLE: "Design and Operation of Submerged-Combustion Evaporator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 69-79

TEXT OF ENGLISH ABSTRACT: This paper is a summary of the design and operation of a submerged-combustion evaporator. This technique can attain three aims: to recover the spent hydrogen to be used as fuel for evaporation; to raise the concentration of NaOH liquor; and to recover the exhaust gas, which is relatively pure nitrogen, to be used as protective gas. This useful technique has not been widely adopted in our country because of the lack of safety measures.

In this paper the condition of stability of the submerged combustion and the factors causing explosion are analyzed. A design principle to reduce the pressure fluctuation and some safety measures against explosion are proposed.

AUTHOR: SONG Yatong [1345 7161 2717]

ORG: None

TITLE: "Research on Artificially Generated Earthquake Records"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 80-89

TEXT OF ENGLISH ABSTRACT: In this paper, a survey is made of the research works on artificially generated earthquake records. For structural design purposes, the author proposes a method of creating artificial earthquake acceleration-time records which are compatible with a given smooth design spectrum, and develops a corresponding computer program. This presupposes that the ground motion in an earthquake consists of a linear combination of various harmonic motions with stochastic phase angles. The amplitudes of the Fourier spectrum are then modified step-by-step until the amplitudes of the response spectrum of the artificially generated earthquake record match the given design spectrum most closely. The resulting artificial time records are representative of the given earthquake intensity and design spectrum, and will provide a reliable basis for the aseismic design of important engineering structures.

AUTHOR: DING Dajun [0002 1129 6874]

ORG: None

TITLE: "Discussions on Some Problems in the Design of Masonry Structures"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 90-104

TEXT OF ENGLISH ABSTRACT: In this paper, the author gives his own opinions on several problems in the Design Code of Masonry Structures GBJ 3-73.

For the influence coefficient of eccentricity (eccentricity coefficient), the author endeavors to offer some theoretical explanations and makes an investigation into the possibility of improvement. For the computational height (effective length) of a wall supported on four sides, he suggests a set of three consistent formulas. For the calculation of bearing (on partial area), he gives some practical proposals based on recent test results in this country.

AUTHOR: WU Mingwei [0702 2494 0251]

ORG: None

TITLE: "On the Layout of Urban Industry"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 105-112

TEXT OF ENGLISH ABSTRACT: Based on a survey of the present status of our city-planning practice, the author gives a preliminary summary of the problems concerning the overall arrangement of urban industry in our country. The article consists of four parts: the structure of urban industry, the types of distribution of industries, the organization of the industrial district and the layout of the small local industries.

The author advances some views on the relationship between the economic arrangement and urban planning, and the relationship between the structure and layout of industries. The method of organizing the industrial district, the correct attitude toward the small industries and their layout are also discussed.

AUTHOR: GAN Cheng [3927 2906]

ORG: None

TITLE: "How to Improve the Thermal Stability of the Light Exterior-Protected Construction of an Air Conditioned Room"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1980 pp 113-120

TEXT OF ENGLISH ABSTRACT: This paper shows that it is incorrect to specify the thermal stability of an exterior-protected construction by its index of thermal inertia, and that the thermal stability rather depends upon its decrement factor and characteristic time. The means of improving the thermal stability of a light exterior-protected construction of an air conditioned room are pointed out.

9717
CSO: 4009

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WANG Zonghong [3769 0112 7703]
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ORG: All of the Department of Electric Power Engineering, Qinghua University

TITLE: "The Optimal Fast Turbine Valve Control and Its Experimental Research on Micro-Alternator System"

SOURCE: Beijing ZHONGGUO KEXUE [SCIENTIA SINICA] in English Vol 23 No 7, Jul 80, p 923

TEXT OF ENGLISH ABSTRACT: This paper suggests a plan of optimal fast turbine valve closed-loop control for large turbo-generator in long-distance transmission system. It is proved, not only from theoretical analysis and calculations but also through experiments on a micro-alternator system, that the fast turbine valve controller designed according to the linear optimal control theory can markedly increase the transient stability limit of the transmission system under temporary or permanent fault conditions and greatly improve the dynamic quality during the post fault period. An important characteristic of the suggested control plan is that it can adjust itself to distinguish and suit the changes of different fault conditions, which can hardly be obtained by the fixed logical open-loop control plan.

[Continuation of ZHONGGUO KEXUE Vol 23 No 7, Jul 80]

AUTHOR: GUAN Dexiang [7070 1795 4161]
LI Yinting [2621 5593 0080]
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ORG: GUAN and LI both of the Institute of Mechanics, Chinese Academy of Sciences; XUE of the Institute of Geology, Chinese Academy of Sciences

TITLE: "A Fluid-Dynamic Model of the Ascending Flow in the Mantle Plume"

SOURCE: Beijing ZHONGGUO KEXUE [SCIENTIA SINICA] in English Vol 22 No 9, Sep 79 p 1070

TEXT OF ENGLISH ABSTRACT: It is of significance, both for the exploitation of geothermal resources and for an understanding of the causes of volcanic and seismic activities and the continental drift, to make a thorough study of the ascending flows in the mantle plumes that lie beneath the hot spots of the earth. In this paper, a fluid-dynamic model of this ascending flow is presented. The extent of the mantle plume, the maximum temperature difference and the maximum velocity of the ascending flow in the mantle plume, and the heat transported by the mantle plume to the lithosphere have all been estimated. The results are found to be in good accord with the available data from geophysical observations.

9717
CSO: 4009

AUTHOR: KU Huan [2688 3883]

ORG: None

TITLE: "Abundance of Flowers and Giant Fruits of Environmental Research"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 1-2

ABSTRACT: If problems of environmental pollution are not resolved or not resolved well, the progress of socialist construction will be affected, China's reputation will be affected, and the people's health will be damaged. In 1972, the Chinese Academy of Sciences began to organize scientists of various fields to participate in scientific research for environmental protection. Since then, 20 first prizes and 2 second prizes have been awarded by the National Science Conference, and 12 important fruits of science and technology prizes awarded by Chinese Academy of Sciences with respect to regional environmental surveys and studies on environmental quality. The paper reviews various advances in studies on the accumulation, conversion, metabolism, and decomposition of mercury, cadmium, lead, zinc, and agricultural drug contamination, the effective use of activated charcoal, catalysis, membrane technique, extraction separation, and microbiological methods of direct elimination of sources of pollution, and aspects of effects of environmental pollution on human health, in these years, especially since 1977.

AUTHOR: QU Geping [2575 2706 1627]

ORG: None

TITLE: "Industrial Production and Environmental Protection (I)"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 3-6, 2

ABSTRACT: Environmental protection is one of the important contents of socialist modernization. A society cannot be modernized if it is not clean and beautiful. In the first segment of the paper, a global strategy of environmental protection evolved from the Stockholm Conference of 1972 is discussed. In the second segment, the paper discusses the condition of China's environment, including paragraphs on air pollution, water pollution, industrial solid waste, destruction of natural environment, destruction of grasslands. This paper is the first part of a reprint of a report delivered by the author at the Beijing Symposium of Industrial Economy and Industrial Management in Dec 79, with some abbreviation.

AUTHOR: GUO Zuyuan [6665 4371 3293]

ORG: None

TITLE: "Do a Good Job of Economic and Technical Assessment of the Environment"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 7-8

ABSTRACT: Mankind's activities of developing production and improving livelihood are limited by the natural environment on the one hand and are causing changes of the natural environment on the other. An assessment of the quality of the natural environment at a factory or a water system is for the purpose of protecting the environment, with the development of production, improvement of livelihood, and contributing to the welfare of the people as the final goal. Assessment for the purpose of assessment just will never do. The evaluation must be of the entire environment, including, aside from the natural environment, the social and political environment as well. The economy is the foundation of politics and the key to scientific and technological development, and the basis for cultural environment as well. In the past, the concept of environmental assessment was limited to natural or ecological evaluation. An account of the damages of 3 wastes was made, but not the material and energy contents of the 3 wastes. There was only an account of cost estimate for treatment and control, but not the benefits. This paper points out the various economic benefits of environmental protection measures.

AUTHOR: None

ORG: Suzhou Municipal Bureau of Environmental Protection

TITLE: "Charging Pollution Fees is an Important Measure of Environmental Management"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 8-10

ABSTRACT: Suzhou, the traditional heaven, is now having serious problems of environmental pollution. The masses are aware of the damages on them and are violently demanding control measures. Beginning in Sep 79, the bureau has practiced a system of charging pollution fees from 15 factories. The method has had positive effects on environmental protection. This paper describes the details of the system currently in effect in Suzhou City.

AUTHOR: JIN Jianming [6855 7003 2494]
ZHANG Weizhen [1728 4850]

ORG: None

TITLE: "Protecting Natural Environment and Natural Resources--Understandings From Learning Methods of Environmental Protection"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 p 13-15

ABSTRACT: The Chinese People's Republic Environmental Protection Law (Trial Implementation) enacted in Sep 79 delineated rules of environmental protection work and activity in China. The law is a realization of the wishes and outcries of all the people of the country and marks a new historical era in China. This paper is an attempt to interpret the contents and goals of that law.

AUTHOR: YUAN Dechang [5913 1795 2490]
LIU Yunxi [0491 0061 0823]
WU Jiangjin [2976 3068 3160]

ORG: None

TITLE: "Ion Exchange Method of Extracting Silver From the Water of Image-Fixing Bath"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 16-17

ABSTRACT: The water of the image-fixing process of motion picture film contains 1-50mg/liter of silver, far exceeding the limit of 0.1-0.5mg/l set by the state. Reclaiming the silver from the waste water is not only economically worthwhile, but may also reduce the heavy metal burden of the waterways. This paper describes, step by step, an experiment on the use of ion exchange resin absorption and sodium dithionate reduction techniques to extract and reclaim the silver content.

AUTHOR: ZHANG Shuyi [1728 2579 0034]

ORG: None

TITLE: "A New Procedure of Closed Cycling of White Liquid Waste of the Paper Making Process"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 18-20

ABSTRACT: Tianjin Paper Mill uses primarily Phragmites communis Trin. as the raw material, steamed in magnesium hydrogen sulfite, and bleached with calcium chlorate to produce paper. A large quantity of water is consumed in the production processes. In the past, the plant discharged 50,000 m^3 of liquid waste to create serious pollution problem for Haihe, which is the source of drinking water for the city, and the nearby Bohai Bay. An analysis of the quantity and the content of the liquid waste indicates that it is divided into 3 types: the black cooking waste, the beaching waste, and the waste of the paper-making machine. The last type, the white liquid, amounts to 34 percent of the total quantity, and has a relatively simpler content. A technique has been adopted by the mill to use a flocculant to cycle the white liquid before reusing it in the paper-making machine. This technique of closed cycling is reported.

AUTHOR: ZHANG Jian [1728 6943]

ORG: None

TITLE: "A New Waste Water Treatment Method"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 21-22

ABSTRACT: The PSB method (photosynthesis bacteria) is a method of treating harmful organic matter and deoxidizing waste water. After treatment, the residual bacteria have high nutritional value. This type of photosynthesis bacteria, a red colored sulfur-free bacteria, was discovered by a professor of West Germany in a city waste water treatment plant. After treatment the bacteria are suitable as feed for animals and the culture fluid may be used directly as organic fertilizer. This bacteria, the needed industrial installation, and the work procedure are described.

AUTHOR: MA Yuqin [7456 3768 3830]

ORG: None

TITLE: "Radioactive Level of Phosphorus Fertilizer and Its Effect on Water"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 23-25

ABSTRACT: The phosphorus fertilizers used in China are mainly calcium perphosphate, processed from apatite, which is mostly accompanied with trace quantities of natural radioactive elements, mainly uranium, with some thorium and radium, which become part of the phosphorus fertilizer. Experimental data indicate that the uranium content of the fertilizer varies between 0.13 μg - 170 μg/g, the thorium content 1.1-12.0 μg/g, while the radium content is relatively minor. Due to loss of phosphorus fertilizer , water of nearby streams may have a high concentration of phosphorus as well as uranium. This paper reports the u, Th, and Ra contents of Zhangjiakou, Loyang, and Zhanjiang region phosphorus fertilizers being sold in the markets and contents of P,U in 4 nearby streams. Spalding's report of a study on the subject in Mexico Bay is quoted for comparison.

AUTHOR: HE Shiqun [6320 0013 5028]

ORG: None

TITLE: "Irradiation Method of Eliminating Environmental Pollutants"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 25-26

ABSTRACT: Irradiation method is the use of γ ray, x ray, electron ray to treat materials to cause them to change their original characteristics and reach the predetermined objective. Applications of irradiation in environmental protection include rejuvenating the activated charcoal after it has been used to treat liquid waste of the textile industry, manufacturing ozone, disinfecting waste of domestic fowls, urban sludge, etc. Irradiation may also break down the residual organic phosphorus and organic chlorine, etc. The high energy electron accelerator installed by Boston's waste water treatment plant in 1975 is mentioned as an example. The cost of such facilities is discussed along with the work principle and procedure.

AUTHOR: TANG Yijian [0781 0110 0494]

ORG: None

TITLE: "Migration and Conversion of Heavy Metal Elements in Bodies of Water"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 33-35, 41

ABSTRACT: Many heavy metals are known to be environmental pollutants, but in the complex natural environment, states of metals change yet they cannot be biodegraded; therefore, they can be easily concentrated in organisms. In bodies of water, although the solubility of metals is low, the complexing ability is very high. They can easily be attached to organic or inorganic colloids. Some heavy metals may also leave the water and disperse into the atmosphere. This paper attempts to discuss the following problems: (1) In what direction do heavy metals migrate? (2) How do they migrate? (3) What changes are occurring in the process of migration? (4) Are this type of migration and conversion harmful or beneficial to the human environment? The purpose of the discussion is to dispel certain blind optimism concerning the subject matter.

AUTHOR: PAN Yunzhou [3382 0061 5297]

ORG: None

TITLE: "Preventing the Tragedy of Minamata Disease to Reappear On the Banks of Songhuajiang"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 2, 80 pp 40-41

ABSTRACT: The problem of pollution in Songhuajiang has grown to be more and more serious since 1958. In the 300 km section of the river below Kirin City, fish can basically no longer be observed. The leftover fish, containing methyl mercury far exceeding the limit of 0.3mg/kg standard set in China is definitely harmful to humans. Signs of Minamata disease have already appeared on the banks of Songhuajiang. The close to 100 tons of mercury discharged into the river in the past 2 decades has mostly settled to the bottom of the river to release methyl mercury into the water continuously, while the sediments are continuously being moved down stream during every flood season. This paper seeks to bring the situation to public attention. A 7-point proposal to protect the water system and to prevent further development of the Minamata Disease tragedy is included.

6248
CSO: 4009

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ORG: None

TITLE: "Analysis of the Staggered Parallel Blasting in Hot Stoves"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 1-8

TEXT OF ENGLISH ABSTRACT: The increase of hot blast temperatures by means of staggered parallel blasting in hot stoves is discussed.

Through a simulated study, it has been theoretically proved that two stoves staggered parallel on blast have a higher thermal efficiency that does a single stove on blast. The thermal load is also higher than that of a single stove and the dome temperature is lower. The fundamental concepts relating to a high temperature blasting operation are described.

The amount of heat required for the next blast cycle and the time available to get optimum results are calculated with the aid of a computer. The gas/air ratio and their individual flows are controlled vor effective combustion in the hot stove in the staggered parallel blasting model. The staggered parallel

[Continuation of GANGTIE No 1, Jan 80 pp 1-8]

blasting model is used to control the hot blast temperature. The computer controls the volume distribution between the stoves on blast by directly controlling the cold blast regulating valves.

AUTHOR: CAI Zhipeng [5591 1807 7720]
XIE Yusheng [6200 5940 3932]
XIA Anwu [1115 1344 2976]

ORG: None

TITLE: "The Interaction of Supersonic Jet on Liquid Bath in Oxygen Steelmaking"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 14-19

TEXT OF ENGLISH ABSTRACT: This paper summarizes the results obtained from experimental model studies on the behavior of supersonic oxygen jet in top-blown steelmaking converters, especially the interaction of the jet on the liquid bath. Laboratory experiments are performed in accordance with the similarity theory. Representative results, such as axial velocity decay and lateral velocity distribution of the supersonic oxygen jet as well as its penetration depth and impact area on the liquid bath have been obtained. Mathematical models have been established from these results for scale-up to commercial furnaces. A large number of experimental heats on a hot model were carried out in combination with a study on possible reduction of smelting time on a five-ton converter at the Capital Iron and Steel Company in Beijing. The results

[Continuation of GANGTIE No 1, Jan 80 pp 14-19]

proved that an average oxygen blowing time per heat may be reduced from 14 minutes to 12 minutes under otherwise equal conditions.

AUTHOR: LI Zhengbang [2621 2973 6721]
ZHOU Wenhui [0719 2429 6540]
LI Yida [2621 6146 1129]

ORG: None

TITLE: "Mechanism of Removal of Non-Metallic Inclusions in the ESR Process"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 20-26

TEXT OF ENGLISH ABSTRACT: ESR is one of the most effective means of removing non-metallic inclusions from steel. Much controversy exists regarding the mechanism of slag removal in the ESR process.

The ESR process consists of three stages: 1) Formation of droplets on the electrode tip; 2) Droplets falling through the slag; 3) Collection of the metal in a pool at the top of the ingot.

In order to find out which is the main step in the refining process, samples are taken from the solid electrode, the molten film on the electrode tip, metal droplets in the slag layer and the final ingot, and quantitative determination of inclusions made by metallographic, chemical and radioisotopic (indicator $Zr^{95}O_2$) methods.

[Continuation of GANGTIE No 1, Jan 80 pp 20-26]

From the results obtained it is concluded that the removal of non-metallic inclusions occurred mainly at the electrode tip. Results of experiments on industrial furnaces have confirmed this conclusion.

AUTHOR: HE Chongzhi [0149 1504 2535]
MENG Qing'en [1322 1987 1869]
ZHAO Yingwei [6392 3841 0251]

ORG: None

TITLE: "X-Ray Analysis of the Aging Process in 18 Ni Maraging Steels"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 27-34

TEXT OF ENGLISH ABSTRACT: 18 Ni maraging steel possesses relatively high strength and toughness. In this study the substructure, reversely transformed austenite and regularities of changes in lattice parameters during aging are determined by X-ray diffraction. It is shown that after aging treatment at various temperatures below 520°C for three hours martensite matrix has stability of fine substructure and reversely transformed austenite dispersively precipitates at 480°C. The appearance and disappearance of this austenite are accompanied by the growth and refinement of the substructure. These structure parameters explain regularities of changes in mechanical properties and serve as reference data for selection of heat treatment and softening regimes.

AUTHOR: LUO Ligeng [5012 0500 2577]
CAI Qigong [5591 0366 7255]
SHEN Huiwang [3747 6540 2489]
WANG Degen [3076 1795 2704]

ORG: None

TITLE: "The Determination of the Plane Strain J-Integral Crack Extension Resistance Curve"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 35-41

TEXT OF ENGLISH ABSTRACT: In the present paper the plastic part of the J-integral was derived based on the model of pure power hardening materials. The new expression found was $J_p = -\frac{U_p}{B}\left(\frac{1}{P}\frac{\partial p}{\partial a}\right)_\Delta$. An attempt was also made to elucidate the theoretical basis and the approximity nature of the expression in current use $J_p = \frac{2U_p}{B(w-a)}$. This latter expression could be arrived at by assuming $\left(\frac{1}{p}\frac{\partial p}{\partial a}\right)_\Delta \approx \left(\frac{1}{p_L}\frac{\partial p_L}{\partial a}\right)$ and substituting it in the new expression.

In this paper J-integral curves of four kinds of materials were quoted from our

[Continuation of GANGTIE No 1, Jan 80 pp 35-41]

laboratory. It was found from the curves that: (1) within quite a wide range of the specimen sizes the plane strain resistance curve seems to be an inherent characteristic of the materials; (2) to the composition, heat treatment and microstructure of the materials tested, the crack initiation toughness is not as sensitive as the resistance curve; (3) for predicting K_{Ic} of a large specimen with the aid of the resistance curve, different points thereon should be used for the two types of materials. For one type, K_{Ic} is related to the highest point (saturation point), for the other type to the initial point of the resistance curve.

AUTHOR: LIANG Guoping [2733 0948 1627]

ORG: None

TITLE: "The Optimum Distribution of Loads on Rolling Mills"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 42-48

TEXT OF ENGLISH ABSTRACT: Methods of load distribution used in our country and abroad are reviewed from the view of technological requirements and mathematics, and tandem mills are taken as examples. Based on summary and analysis of many distribution methods used in plants, a concept about load function is proposed. In addition, the optimality of "equal load" distribution is proved. A regime of optimum load distribution and its calculation are given.

AUTHOR: YANG Fachang [2799 4099 2940]
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ORG: None

TITLE: "Eccentricity of Wheels in Hot Rolling"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 49-58

TEXT OF ENGLISH ABSTRACT: There is always eccentricity in pressed and rolled wheels, which adversely affects their use, service life and cost. There are many points of view about eccentricity of wheels. According to the production technology of wheels, we have analyzed blanks for wheels worked after every operation under the same conditions. The analysis shows that in blanks formed on 8000 t hydraulic press there are two different centers for inside and outside hubs. After rolling the blanks have three centers, two for inside and outside hubs and one for internal diameter of inside and outside rims. After coning wheels with four centers are obtained, i.e., two centers for inside and outside hubs and two centers for inside and outside rims.

The authors came to the conclusion that it is important and necessary to control the atmosphere in the heating furnace, to remove the scale by high pressure

[Continuation of GANGTIE No 1, Jan 80 pp 49-58]

water, to improve the structure and hydraulic system of the platform for the hydraulic press and to improve the impressing mechanism of 3000 t hydraulic press as well.

AUTHOR: WEI Zhenyu [7614 2182 1342]

ORG: None

TITLE: "On the Metallurgical Problems of Some Precipitation Hardening Stainless Steels"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 1, Jan 80 pp 59-64

TEXT OF ENGLISH ABSTRACT: Though precipitation hardening ultra high strength stainless steels have been developed for decades, the development of space science, modern defense and some important civil applications stimulates new grades to appear successively. The history, present status and outlook of precipitation hardening ultra high strength stainless steels are briefly described. Works about the influence of metallurgical factors, especially physical metallurgy, on the properties of this type of steel abroad are reviewed. Maraging stainless steels developed since the 60's and means of improving their toughness are emphasized. Considerations about the development of new grades of precipitation hardening ultra high strength stainless steels are proposed.

9717
CSO: 4009

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ORG: Department of Mathematics, the Mathematics Institute, Jilin University

TITLE: "A Class of Operators and the Spectral Theory (II)--The Restriction and Quotient of (AC) Operator"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 1-9

TEXT OF ENGLISH ABSTRACT: This paper is a continuation of a previous paper. We investigated the heredity of (AC) operator which is on a spectral maximal space. We have proved that: (1) If $T \in \mathfrak{B}(\mathfrak{X})$ is (AC) operator, and $\mathfrak{Y}$ is a spectral maximal space, then the restriction $T_{\mathfrak{Y}} \in \mathfrak{B}(\mathfrak{Y})$ of T on $\mathfrak{Y}$ and the quotient operator $T^{\mathfrak{Y}} \in \mathfrak{B}(\mathfrak{X}/\mathfrak{Y})$ induced by T on $\mathfrak{X}/\mathfrak{Y}$ is the (AC) operator. (2) If $T \in \mathfrak{B}(\mathfrak{X})$ is a decomposable operator, and $\mathfrak{Y}$ is a spectral maximal space, the quotient operator $T^{\mathfrak{Y}} \in \mathfrak{B}(\mathfrak{X}/\mathfrak{Y})$ induced by T on the quotient space $\mathfrak{X}/\mathfrak{Y}$ is a decomposable operator. This is a positive answer to the open question of I. Colojoara and C. Foias.

AUTHOR: WANG Junyu [3769 0193 4416]

ORG: Department of Mathematics

TITLE: "The Semigroup Approach to Cauchy Problem for the System of Gas Dynamics with a Viscosity Term"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 10-18

TEXT OF ENGLISH ABSTRACT: In this paper we consider the Cauchy problem for the system of gas dynamics with a viscosity term $u_t + [p(v)]_x = \mu u_{xx}$, $v_t - u_x = 0$. By means of the theory of nonlinear semigroups, we have proved the existence and uniqueness of the generalized solution of this problem. It follows from the Sobolev imbedding theorems that the generalized solution is in fact a classical solution provided the initial data and the function p(v) are of appropriate smoothness.

AUTHOR: ZHOU Yulin [0719 3022 2651]

ORG: Beijing Institute No 9

TITLE: "On the Nonlinear Boundary Problems for Quasilinear Elliptic and Parabolic Equations"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 19-46

TEXT OF ENGLISH ABSTRACT: In this paper, the nonlinear boundary value problems

$$\sum_{j=1}^{N} d_j(x) \frac{\partial u}{\partial x_j} = \varphi(x,u)$$

are considered for quasilinear elliptic and parabolic equations

$$\sum_{i,j=1}^{N} a_{ij}(x) \frac{\partial^2 u}{\partial x_i \partial x_j} + f\left(x,u,\frac{\partial u}{\partial x_1}, \ldots, \frac{\partial u}{\partial x_N}\right) = 0,$$

$$\sum_{i,j=1}^{N} a_{ij}(x,t) \frac{\partial^2 u}{\partial x_i \partial x_j} + f\left(x,t,u,\frac{\partial u}{\partial x_1}, \ldots, \frac{\partial u}{\partial x_N}\right) = \frac{\partial u}{\partial t} .$$

Different sufficient conditions are obtained for the existence of solutions for these problems. In the parabolic cases, the so-called "supplementary

[Continuation of JILIN DAXUE ZIRAN KEXUE XUEBAO No 1, 1980 pp 19-46]

function" methods are used to obtain the interior and boundary estimates of derivatives of solutions, for differential equations and approximating difference-differential equations. Furthermore, problems of periodic solutions without initial conditions, of continuous initial values and of domain with infinite time are studied.

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ZHU Ziqiang [2612 5261 1730]
ZHANG Yujun [1728 3768 0689]
ZHANG Banggu [1728 6721 0942]

ORG: All of the Department of Physics

TITLE: "The Optical Model Analysis of Fast Neutron Scattering for ^{6,7}Li"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 47-54

TEXT OF ENGLISH ABSTRACT: This paper has systematically analyzed the fast neutron scattering data for ^{6,7}Li by means of the optical model method. The incidence energy is 4.83-15 MeV and 7-15 MeV for ^{6}Li and ^{7}Li respectively, and the data analyzed include total cross section, elastic cross section and angular distribution. The result obtained is in good agreement with the experimental data. The optical potential we use is of the Woods-Saxon type with surface absorption and spin-orbit coupling. We choose diffusion parameter of the real part and surface absorption depth as energy dependent parameters which vary with incidence energy linearly. All other parameters are independent of energy and, in addition, they are the same for ^{6}Li and ^{7}Li. We discovered that the diffusion parameter of the real part slowly decreases with the increasing of incidence energy.

AUTHOR: LI Yongji [2621 3057 1015]

ORG: Department of Physics

TITLE: "A New Effect of X-ray Diffuse Diffraction from Single Aluminum Crystals under Cold-Work"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 55-65

TEXT OF ENGLISH ABSTRACT: The diffuse diffractions of X-rays from single crystals of aluminum under mechanical extension are reexamined, and the change of the shapes of the surfaces of equal diffusion after extension surrounding some reciprocal-lattice points are analyzed diagrammatically. We conclude that it is really a new effect never observed by others before.

AUTHOR: SU Wenhui [5685 2429 6540]
LIU Chunlin [0491 2504 2651]
LIU Chenghui [0491 2110 1920]

ORG: All of the Department of Physics

TITLE: "The Potential Functions of Interatomic Interaction and the High-Pressure Equations of State for Zinc and β-Brass"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 69-79

TEXT OF ENGLISH ABSTRACT: In the present paper, the potential functions of interatomic interaction for zinc and perfect-ordered CuZn alloy are dealt with by using the experimental data of lattice parameter, sublimation and formation heat, and compressibility (or elastic constant). The four typical Gruneisen constants-volume relations and their high-pressure equations of state are calculated. The high-pressure equation of state for nearly perfect ordered β-brass has been discussed, with the ordered parameter introduced. The theoretical calculation of the high-pressure equation of state for zinc and the experimental results of the shock wave are found to be agreeable (the deviation is less than 6 percent near 500 kb).

AUTHOR: XU Jiqing [1776 0679 1987]

ORG: Nitrogen Fixation Research Group, Department of Chemistry

TITLE: "On the Theory of Chemical Bond in Transition-Metal Dinitrogen Complexes (II)"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 83-95

TEXT OF ENGLISH ABSTRACT: In this paper the stabilization energy, charge density on the nitrogen atoms, and bond order between the two nitrogen atoms of trinuclear transition-metal dinitrogen complexes, in which N_2 had been coordinated to the metals in different forms, are calculated and discussed by using the methods of HMO and graph theory. It is found that the varying tendencies of charge density on the N atoms in trinuclear dinitrogen complexes are similar to those in mononuclear and binuclear dinitrogen complexes. However, the varying tendencies of stabilization energy of trinuclear dinitrogen complexes are different from those of mononuclear and binuclear dinitrogen complexes. From the calculated results, it is deduced that coordinating activation of N_2 by nitrogenase may be the concerted effects of multinuclear cluster involving both end-on and side-on coordination.

AUTHOR: GUO Dongyao [6753 2639 5069]

ORG: Institute of Theoretical Chemistry

TITLE: "X-Ray Extinction in the Bragg Case"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 96-102

TEXT OF ENGLISH ABSTRACT: In this paper we have established the differential equations of dynamics (Zachariasen-type) in the asymmetrical Bragg case. Making use of Chen's integral table (1965) and Becher's primary extinction coefficient (1974), we obtained the solutions to the equations. Thus, Chen's results have been extended to the more general case where asymmetrical reflection, primary and secondary extinction occur simultaneously.

AUTHOR: QIU Zuwen [5941 4371 2429]

ORG: Institute of Theoretical Chemistry, Jilin University

TITLE: "On the Method of Analyzing the NMR Spectra in Liquid Crystal Solvents"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 103-124

TEXT OF ENGLISH ABSTRACT: In this paper, the topic on the method of analyzing the NMR spectra in liquid crystal solvents is briefly reviewed from a more unified point of view, although the major parts are mainly out of the treatise written by Emsley and Lindon as well as some other articles in this field. However our discussions are limited to those systems that can be solved exactly to give solutions with closed analytical forms. No attempt has been made to discuss the numerical methods by using computer simulation.

This review includes three parts: In part (1) we concentrate our attention on discussing the method of getting the general expressions of AB_n and AB_nX spin systems. Systems of A_n, AB, AB_2, AB_3, ABX, in Emsley's treatise are all the special cases of our general expressions. In part (2), AA'A"A"'A"" system with

[Continuation of JILIN DAXUE ZIRAN KEXUE XUEBAO No 1, 1980 pp 103-124]

C_{5v} symmetry is discussed in detail for illustration. In part (3) we deal with the spin systems having quadrupolar nuclei and then the expressions obtained in a unified fashion. Some mistakes occurring in the original reference books and papers are corrected as well.

AUTHOR: JIN Feng [6855 6912]
FAN Junqing [5400 0193 3237]

ORG: Both of Changchun Institute of Physics, Chinese Academy of Sciences

TITLE: "Theoretical Review of Guided Wave Optics"

SOURCE: Jilin JILIN DAXUE ZIRAN KEXUE XUEBAO [NATURAL SCIENCE JOURNAL OF JILIN UNIVERSITY] in Chinese No 1, 1980 pp 125-134

TEXT OF ENGLISH ABSTRACT: A theoretical review is given of the field of guided wave optics. The eigenmodes of slab dielectric waveguide are summarized, and on this basis coupled mode equations and their solutions of optical waveguide with perturbation are given. Topics treated here include coupling between guided mode and radiation modes, coupling between two guided modes, diffraction of guided mode, TE-TM mode conversion, and relative optical guided wave devices.

9717
CSO: 4009

Natural Sciences

AUTHOR: MO Shaokui [5459 4801 2247]

ORG: None

TITLE: "On the Nature of Higher Order Functions and Operators"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 1-10

TEXT OF ENGLISH ABSTRACT: In restricted predicate calculus we deal with functions, namely, the thing functions, which take individuals as values, and the propositional functions, i.e. predicates. Usually they take only individuals as arguments. Such a restriction seems, however, too severe. It would be better if we were to allow them to take propositions also as arguments. In addition, we also deal with operators, namely, quantifiers and descriptions. By the same reason, it would be better if we were to allow them to also take terms as their scopes and to take propositional variables as the directive variables. Further, in the extended predicate calculus, we also deal with functions of higher order and operators of higher order. We usually consider them to be quite different from each other.

In the present paper we show that: First, the functions of the second order

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 1-10]

are the same as the operators of the first order. For example, the expression $\varphi(A)$, where φ is a function of the second order and A is a two-place first order function, may also be represented as $\varphi_{xy}A(x,y)$, where φ_{xy} is an operator of the first order with two directive variables x and y. On the other hand, the expression $\lim\limits_{x\to\alpha} f(x)$, where lim is an operator of the first order, may also be represented as $\lim(\alpha, f)$, where lim is now a function of the second order with one individual argument and one function argument (of first order). In general, the functions of order n+1 are the same as the operators of order n. (Nevertheless, see the following.)

Second, when we apply functions of the second order (i.e., operator of first order) to functions of the first order to form a term or a formula, it is not that the former (of higher order) take the latter (of lower order) as arguments (so asserted by the prevailing opinion), but that the former become arguments of the latter, or at least that the former bind the empty places of the latter. In any event, we cannot say that the latter are arguments of the former. Hence the usual expressions $A_{x\alpha}(x)$ and $\lim\limits_{x\to\alpha} f(x)$ should be written as $(\alpha A$ and $(f \lim \alpha$ or as $A\alpha(i)$ and lim a f(i). (We stipulate that if operators should be written after the scope they must be coupled with left parentheses.)

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 1-10]

Third, since the first order operators (i.e., functions of the second order) never take functions of the first order as arguments, there is no room to give rise to higher functions and operators. Hence we have only individuals, propositions, functions (of the first order) and operators (of the first order, i.e., functions of the second order). The extended predicate calculus would become much simpler.

AUTHOR: YE Yanqian [5509 1750 6197]
LIN Yingju [2651 2019 5281]

ORG: None

TITLE: "Nonlinear Differential Equations in Electron Beam Focusing Theory (II)"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 11-18

TEXT OF ENGLISH ABSTRACT: As a continuation of a previous paper, we use in this note the series expansion (4) of the periodic solution $\overline{u}(x)$ of (1) and (2) to study its stability. Our results agree very well with the experimental results of Mendel, Quate and Yocom. That is to say, when $0<\alpha<0.4$ or $0.658<\alpha<1$, $\overline{u}(x)$ is stable, and when $0.4<\alpha<0.658$, $\overline{u}(x)$ is unstable.

We have already seen that there exists a close relation between geometrical properties of the curve $u = u^*(x_0, \alpha)$ (which we wrote simply as $u = u^*(x_0)$, denoting the locus of the first minimum and maximum points of solutions of (1) and (2)) on the one hand, and the existence and number of periodic solutions of (1) and (2) on the other hand. Now, by means of numerical calculation, we

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pp 11-18]

find furthermore that when $\alpha \doteq 0.4$, the shape of the curve undergoes a sudden change, i.e., when α increases and passes through the value 0.4, the curve $u = u^*(x_0, \alpha)$ changes from II to III. All these phenomena together with the stability properties described above deserve strict theoretical explanations.

Finally, we explain some known experimental results from the mathematical point of view, which is quite different from that of the engineers.

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ORG: None

TITLE: "Asymptotic Solution of Singular Perturbation Mixed Problems for the Second Order Quasi-linear Hyperbolic Partial Differential Equations"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 19-30

TEXT OF ENGLISH ABSTRACT: In this paper we discuss mixed problems for the second order quasi-linear hyperbolic partial differential equations, which involve small parameters in the higher order derivatives. As $\varepsilon = 0$, the original equations are degenerated into the lower order differential equation, and a part of the boundary conditions is lost. The problems of this type are called singular perturbation problems. We constructed an asymptotic solution to the presented problem and investigated the asymptotic behavior of the solution.

AUTHOR: YAO Chongguo [1202 0339 0948]
WANG Houwen [3769 0624 4489]
CHEN Yimei [7115 4135 2734]

ORG: None

TITLE: "The Design of a 5 MeV Electron Linear Accelerator for the Industry"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 31-45

TEXT OF ENGLISH ABSTRACT: We have designed a 5 MeV electron linear accelerator for industry. Its accelerating tube, which consists of the buncher and main light velocity section, has a constant hole radius of the disk. In this paper the methods and results of computation of the operating specifications, focusing magnetic field and electron gun design are described. Some of the data of the computation on the transverse motion which are useful for the design of the structure are also given.

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ORG: None

TITLE: "Radiocarbon Dating of Some Geophysical Samples in China"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 47-52

TEXT OF ENGLISH ABSTRACT: Some samples from different geological origins and different geological ages are dated by means of ^{14}C using liquid scintillator method. The samples range from buried old wood in glacier deposits at 4200 and 3900 meters above sea level in Xizang (Tibet), the wood in a karst cave of Guizhou Province and charcoal in civilization layers in Liyang of Jiangsu Province, with geological ages ranging from 1000 to 7000 years ago.

The carbon is first converted into calcium carbide at $980^{\circ}C$, then it is hydrolyzed into acetylene and converted into benzene using silica-alumina catalyst. The catalyst was activated in chromic acid before using. The scintillator has

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 47-52]

36 g PPO + 0.6 g POPOP dissolved in 1 liter of Xylene. One mixes 1 ml of scintillator in each 5 ml of benzene.

The purity of benzene is controlled by ex-radioactive source channel compare method. The samples are contained in teflon bottles of 8 ml in capacity and are viewed by two photomultipliers in coincidence counting circuits.

The counting time for each sample is 1000 minutes for each run. The data are corrected with Damon's table.

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WU Caiyu [0702 6299 6735]
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ORG: None

TITLE: "Investigations on A.C. Oscillographic Polarographic Titration. III. Titration of Zinc by EDTA and Ferrocyanide by Zinc"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 53-60

TEXT OF ENGLISH ABSTRACT: In this paper, it has been shown that the AC oscillographic polarographic titration can be applied advantageously to titrate Zn^{2+} by EDTA and ferrocyanide by Zn^{2+}. A thin film mercury electrode was used as the polarized electrode and Ag-coated Hg electrode as reference electrode. AC oscillographic polarographic titration was more rapid and accurate than the indicator methods. AC oscillographic titrations can be carried out in the presence of colored precipitates from ferric hydroxide and other reagents which interfere with the titration of indicator methods. Thus, zinc can be titrated in an ammonium solution in the presence of precipitates formed by sodium

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diethyldithiocarbamate and interfering ions such as Fe^{3+}, Al^{3+}, Pb^{2+}, Cu^{2+} and Mn^{4+}. A rapid method is described for determination of Zn in minerals.

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ORG: None

TITLE: "The Synthesis of Labetalol"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 61-64

TEXT OF ENGLISH ABSTRACT: The combined α- and β-adrenoceptor blocking drug, Labetalol, is designed for the treatment of all grades of hypertension. It was prepared from methyl 5-bromoacetylsalicylate in three steps (total yield 22.4 percent) and from 5-chloroacetylsalicylamide in two steps (total yield 31.2 percent).

AUTHOR: XU Zhentao [1776 2182 7290]
JIANG Yaotiao [5592 4507 4511]

ORG: None

TITLE: "The Physical Explanation of the Sun-Climate Relationship"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 65-75

TEXT OF ENGLISH ABSTRACT: This paper has reviewed new advances in the investigations concerning the physical mechanisms of the sun-climate relationship. The main contents are: (1) the variation of the solar constant and its influence on climatic variation; (2) the sun-atmosphere energy coupling; (3) the solar activity and the atmospheric electricity. In addition, the research history and future progress of this subject are described briefly.

AUTHOR: WANG Xuyi [3769 4872 1355]
CHEN Huasheng [7115 5478 3932]

ORG: None

TITLE: "Performance Evaluation of Computer Systems"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 76-92

TEXT OF ENGLISH ABSTRACT: Because of the continuous developing of the complexity of computer architecture and computer applications, the performance evaluation of computer systems is rapidly developed and it has become one of the important research domains of computer science. It seems to us that the main objective in studying system performance evaluation is to enable us to design computer systems more efficiently and to enhance cost effectiveness and to facilitate various applications.

This paper summarizes developments in system performance evaluation, then describes in detail three major methods of evaluation: analysis, simulation and measurement as well as their applications by way of examples. Different viewpoints are presented by the authors of this paper.

AUTHOR: ZENG Zhaoqi [2582 2507 3825]
CHEN Xi [7115 2569]
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ORG: None

TITLE: "Studies on the Cyanophyta of China. III. Fossil Blue-Green Algae from the Dainan Formation (Lower Tertiary) of Northern Jiangsu"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 93-96

TEXT OF ENGLISH ABSTRACT: In this paper three new species of fossil blue-green algae were reported. They are Arthrospira breviarticulata Chu et Tseng sp. nov., Lyngbya macrocephalina Chu et Tseng sp. nov., and Plectonema ectoderma Chu et Tseng sp. nov. All the species were discovered from the Dainan formation (Lower Tertiary) of northern Jiangsu Province. From these three fossil algae, which we consider as freshwater species, it is proved indirectly that sediments of the Dainan formation (Lower Tertiary) of northern Jiangsu were freshwater facies.

AUTHOR: CHEN Kerong [7115 0344 2837]
LIU Changshi [0491 2490 1395]
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YE Jiashan [5509 0857 0810]
CHU Xuejun [2806 7185 0689]
ZENG Jiahu [2582 1367 3275]

ORG: None

TITLE: "The Study of Characteristics of an Old Caldera and Its Associated Subvolcanic Granitic Body"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 97-120

TEXT OF ENGLISH ABSTRACT: This paper is a preliminary analysis of a late Jurassic caldera occurring in the vicinity of Zhongteng district. The caldera, being about 600 km^2 in area, is located at the intersection of two sets of fracture zones trending NE-SW and E-W respectively.

In the center of the caldera is a granitic stock covering an area of about 90 km^2. It possesses the features of a ring complex and is composed of

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980
pp 97-120]

quartz-monzonite-diorite, quartz-monzonite including monzonitic granite and fine-grained granite from the outer to the inner ring. According to the geological occurrence and the characteristics of petrochemistry and mineral composition, it is clearly shown that the ring complex was formed by comagmatic activity through three stages of intrusion.

The country rocks of the Zhongteng igneous body consist principally of volcanics, ranging in composition from intermediate to acidic with a total thickness of about 1620 m, in which a great number of welded tuffaceous rocks constitutes three cooling units amounting to 1440 m in thickness. These volcanic rock series are concentrically distributed and dip inwardly around the central stock. It is believed that the Zhongteng caldera was formed through collapse on a large scale following the strong eruption of volcanic ash flows. The depth of collapse in the central part is estimated to be about 500 m. In addition, there are four parasitic volcanoes and two occult explosive bodies arranged in a semicircular pattern around the Zhongteng body.

The Zhongteng body was placed beneath the earth's surface at about 300-1100 m. In summing up the results concerning the texture of rocks, the temperature measuring of inclusions, the triclinity of potash feldspars, the coefficient of

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980
pp 97-120]

oxidation and the widely developed columnar joints, it is suggested that the Zhongteng intrusive complex may be recognized as a typical subvolcanic body.

A number of petrochemical diagrams demonstrate that the volcano-intrusive complex in the Zhongteng area is characterized by the calc-alkaline rock series.

The writers are led to the conclusion that the rock series were virtually derived from the evolution of the andesitic magma which ascended from the top of the upper mantle along the fracture zones at the continental margin and remelted contemporaneously the continental crust to form abundant acidic melts. The successive eruption and intrusion activities evidently led to the Cu and Mo mineralization in the later phase of magmatic process.

AUTHOR: YANG Huairen [2799 2037 0088]
XU Xin [1776 7451]

ORG: None

TITLE: "Quaternary Environmental Changes in Eastern China"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 121-144

TEXT OF ENGLISH ABSTRACT: The climatic and environmental changes of eastern China may be summarized as follows:
(1) Plio-Pleistocene morphogenetic movements initiated glaciations in eastern China. Late Pliocene earth movements persisted strongly into the Pleistocene. Since the beginning of the Pleistocene period a new stage of earth history of China was set. The rise of the continent and the lowering of the sea level increased the albedo and the continentility. As the land relief became higher and higher Plio-Pleistocene conglomeratic deposits of "Molasse" type spread widely. The authors suggest that the conspicuous morphogenetic movement, chiefly great faulting movements in China, has fundamentally affected the pattern of global atmospheric circulation and led to the glacierization of different parts of China.
(2) There is a formidable amount of evidence from many different lines of

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 121-144]

research to show that during the glacial epoch the polar front and cyclone track shifted southward while the summer monsoon became much weaker. Late Pleistocene snowlines, lower limits of periglacial processes and boreal flora have depressed 1000-2000 meters. Between 30,000 years B.P. and 12,000 years B.P. the shift of the periglacial zone was about 1600 km and the periglacial environment dominated the eastern great plains and the adjoining mountainous regions north of 30°N.

The younger loess (Malan loess of north China and the upper Shiashu loess of the Nanjing area) were accumulated during the Tali (Würm-Wisconsin) glaciation. The "Basal gravels" might have accumulated during the Emm interglacial, representing an intervening erosion phase. As revealed by pollen analysis, paleosals developed during the interglacial or interstadial periods. There is clear evidence that throughout the Quaternary the climate became colder and drier. The Tali (late Würm) glaciation was the coldest and driest one. But the temperature of Lushan/Taku (Halsteim) interglacial was 4°C higher than it is now.
(3) A cold trough existed in eastern China during the Pleistocene ice age and the little ice age.

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 121-144]

The Pleistocene snowline descended from the western regions to the east coast. When it reached the Lower Changjiang Valley, it steepened conspicuously. Late Pleistocene Mammuthus-Coelodonta Fauna moved southward to 34°N, showing their greatest southward extension in the world. Boreal vegetations are distributed at 2000-4000 m above sea level today, but descended to 450 m in the Late Pleistocene epoch near the east coast of Zhejiang. Quaternary glaciations and periglacial features have been found in mountainous regions adjoining the Lower Changjiang Valley. Abundant facts recorded in Chinese historical writings provide us with excellent references in studying the much colder climate of eastern China during the little ice age. All the facts mentioned above show the much greater horizontal and vertical displacement of the climatic belts in eastern China.

The territory where the greatest southward displacement of climatic belts has taken place might be defined as the "cold trough" of eastern China. The "cold trough" was vulnerable to the effects of climatic changes. The causal mechanism of the "cold trough" is fully discussed in this paper.

AUTHOR: LU Qiyao [4151 0366 1031]
LIN Zhenyao [2651 2182 5069]

ORG: None

TITLE: "The Evapotranspiration and Supplementary Water Requirement of Paddy Fields in China"

SOURCE: Nanjing NANJING DAXUE XUEBAO [JOURNAL OF NANJING UNIVERSITY] in Chinese Natural Sciences Edition No 1, 1980 pp 145-159

TEXT OF ENGLISH ABSTRACT: In this paper, the evapotranspiration and supplementary water requirement of paddy fields for different cultivating periods in China are estimated from heat and water balance climatological methods. The results may be summarized as follows:

(1) The net radiation (R_0), evapotranspiration (E) and radiative dry index (R_0/Lr) of paddy fields for different cultivating periods in China are shown below:

	R_0 (Kcal/cm^2)	E(mm)	R_0/Lr
first cropping of rice in the double cropping rice system	17.5~22.5	300~400	0.5~1.0

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 145-159]

second cropping of rice in the double cropping rice system	15~30	250~500	0.5~1.5
single cropping of rice:			
1. South cultivating region	20~30	350~550	0.5~1.0
2. North cultivating region	20~35	400~700	1.0~over 16
late maturing variety of single cropping of rice	27.5~42.5	450~700	0.5~1.5

(2) The critical radiative dry index $(R_0/Lr)_c$ needless of irrigation rapidly decreases with the increasing of percolation (P), and the slope of the correlative curve between $(R_0/Lr)_c$ and P gradually decreases with the increasing of R_0. In the present condition of rainfall utilization, irrigation is necessary everywhere and in every cultivating period according to $(R_0/Lr)_c$ of the paddy fields during the cultivating period.

(3) The supplementary water requirement (M) of paddy fields during the cultivating period increases with increasing of P and R_0/Lr, but it increases more rapidly if R_0/Lr is below 1.0 than it does when R_0/Lr is above 1.0.

[Continuation of NANJING DAXUE XUEBAO Natural Sciences Edition No 1, 1980 pp 145-159]

(4) The calculation shows that the ratio of the area of catchment to the area of paddy field (A_c/A_f) also increases rapidly with R_0/Lr and P.

9717
CSO: 4009

AUTHOR: LI Yinting [2621 5593 0080]
GUAN Dexiang [7070 1795 4161]

ORG: Both of the Institute of Mechanics, Chinese Academy of Sciences

TITLE: "Motion of Particles Suspended in Stationary Turbulent Medium at Large Reynolds Number"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 4, Apr 80

EXCERPTS FROM ENGLISH ABSTRACT: The problem of motion of particles suspended in a turbulent medium is of great significance in the study of laser velocity measuring techniques, atmospheric pollution, formation of clouds and rain, and deposition of mud and sand. The key to the problem lies in the "follow-up" behavior of suspended particles with the surrounding medium. There is a great need for laser measuring techniques to determine flow velocity in the turbulence field so as to find a statistical criterion for a complete "follow-up," because only under this condition can suspended particles serve as flow velocity indicators.

[Continuation of KEXUE XUEBAO Vol 25 No 4, Apr 80]

By the "follow-up" behavior of suspended particles we mean the degree to which the velocity of suspended particles depends on, or reflects, that of the flow field. By analyzing the "follow-up" behavior of particles suspended in a known turbulence field, we have succeeded in finding a statistical criterion for complete "follow-up" of suspended particles with the surrounding medium.

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TITLE: "Distribution of Tritium in Natural Water in China"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 4, Apr 80

TEXT OF ENGLISH ABSTRACT: Tritium is a cosmogenic radioactive isotope of hydrogen. It originates from interactions between cosmic rays and the constituents of the upper atmosphere. The dominant nuclear reactions are $^{14}N(n, ^{3}H)^{12}C$ and $^{16}O(p, ^{3}H)^{14}O$, etc. By β^--decay, ^3H, whose half-life is 12.26 years, may change into ^3He, a stable isotope of helium. When water molecules containing ^3H mix with the ordinary molecules of natural water, they circulate together. Since the 1950's, thermonuclear tests have become another important source of ^3H, so at present the majority of ^3H found in natural water comes from thermonuclear tests. As a subject of basic research, the scope of the study of the distribution of ^3H in natural water has now become so wide and important that it requires the coordinated efforts of scientists on an

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international scale and has found practical applications in many fields. A large amount of data on ^3H has been accumulated in the world during the past 20 years, and the characteristics of its global distribution in natural water have been studied.

Fifty-six items of data on ^3H concentration in precipitation and surface water samples collected in China during May, 1978 are reported in this paper, and its geographical distribution based on these data is discussed.

AUTHOR: SHEN Zhutong [3088 0031 0681]
SUN Guoxian [1327 1613 7359]

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TITLE: "Some Investigations on Ultrahigh Pressure Sintering of Polycrystalline Diamond"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 5, May 80

TEXT OF ENGLISH ABSTRACT: Experiments have shown that under ultrahigh pressure additives can promote the activity of diamond sintering processes. Therefore, in order to study the mechanism of the formation of sintered diamond and some of its properties, it is important to investigate the forms and characteristics of the additives in it. In this paper research into the sintering of polycrystalline diamond under ultrahigh pressure with nickel as an additive is briefly reported.

AUTHOR: ZHANG Zexiang [1728 3419 3276]

ORG: Group 104, Institute of Physics, Chinese Academy of Sciences

TITLE: "Displacement of Plasma Column in CT6B Tokamak"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 5, May 80

TEXT OF ENGLISH ABSTRACT: The CT6B device is a modification of the CT6A device. Its parameters are the same as the previous one, except that the copper shell is removed and a new vacuum chamber is assembled. The chamber is made of 2 mm rigid stainless steel sections welded together, with a ceramic break and a molybdenum limiter. There is a set of windings (called V-coils) for producing a vertical magnetic field and another (called H-coils) for compensating horizontal stray fields. The plasma displacement is measured by the so-called saddle coils and cosine coils. We have found that this method is better than the Mirrov probe method, especially for a shell-less Tokamak.

AUTHOR: XU Jiquan [6079 0370 3123]
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ORG: XU of the Institute of Soil Science, Chinese Academy of Sciences; FANG of the Department of Geology, Nanjing University; LI of the Department of Geography, Nanjing Teachers' College

TITLE: "Discovery of the Attapulgite Clay in Liuhe County, Jiangsu Province"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 5, May 80

TEXT OF ENGLISH ABSTRACT: Attapulgite clay was discovered in 1976 by the authors of this report at Xiaopanshan and Baitushan hills in Liuhe County, Jiangsu Province. The clay possesses unique physicochemical properties which make it suitable for many uses, especially for oil drilling and decolorization of oil or grease, and great attention is being paid to it by the petroleum and chemical industry.

AUTHOR: GONG Zhiben [7895 4249 2609]

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TITLE: "Effect of Transmission of Pulsed High-Power 10.6 μm Laser on Atmosphere"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 6, Jun 80

TEXT OF ENGLISH ABSTRACT: The presence of atmospheric kinetic cooling caused by atmospheric absorption of 10.6 μm laser radiation has been proved through theoretical analysis and experiments. Breig expanded the work done by Wood et al., and after considering the absorption saturation effect which was neglected by Wood et al., obtained an analytic expression for atmospheric temperature change caused by the atmospheric absorption of high-power CO_2 laser radiation. However, they assumed the specific heat capacity at constant pressure and volume respectively. Now some problems have been encountered in the process of laser beam transmission through the actual atmosphere. Under what conditions are the above assumptions to be made? Under what conditions can the absorption saturation effect be neglected? Can a much more general analytic expression of the atmospheric temperature change be derived? This paper is an attempt by the author to answer these questions.

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MA Zhesheng [7456 0811 3932]
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ORG: ZHANG and TIAN both of Chengdu College of Geology; PENG and MA both of Wuhan College of Geology; HAN and JING both of Xinjiang Mining Bureau

TITLE: "A New Mineral--Ashanite $(Nb, Ta, U, Fe, Mn)_4O_8$"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 6, Jun 80

TEXT OF ENGLISH ABSTRACT: We found a new mineral in northwest China in August, 1977. It is a rich-niobium end member of the ixiolite series. This new mineral was named ashanite after the place where it was discovered, the Altai Mountains ("a" from Altai, "shan" meaning mountain or mountains in Chinese).

AUTHOR: KONG Fan'ao [1313 4907 2407]
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ORG: All of the Department of Chemicophysics, University of Science and Technology of China

TITLE: "Laser Isotopic Enrichment of $^{34}SF_6$ and the Preparation of ^{34}S"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 7, Jul 80

TEXT OF ENGLISH ABSTRACT: Recently there have been many reports on experiments of laser isotopic enrichment of SF_6 with infrared multiphoton dissociation. The aim of all these experiments is the determination of the relative contents of $^{34}SF_6/^{32}SF_6$ in the residual gases by IR or mass spectra. The present paper is a report on what we have achieved along this line and our success in extracting S from enriched SF_6 through hydrolysis, separation, sodium reduction and iodine oxidation.

By using H_2 as a scavenger of laser-induced reactions, the products obtained were several low valent sulfur fluorides and HF. These products were converted

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subsequently into SOF_2 and SiF_4 in glass containers in the presence of trace moisture. Our job in this is to separate the products induced by laser beams from enriched SF_6 and then to turn them into free sulfur.

Because SOF_2 and SiF_4 are easy to hydrolyze and the products of hydrolysis are acidic, we have made use of these properties by hydrolyzing the mixture of gases produced by irradiation and absorbing the new products with NaOH. The SF_6 in the mixture not hydrolyzed was reduced to Na_2S with metallic sodium. Na_2S was then oxidized by I_2 in a weak basic solution. Finally, by means of extracting with CS_2, pure sulfur powder was obtained.

AUTHOR: YANG Minzhi [2799 2404 0037]
LI Yongchun [2621 3057 2504]

ORG: Both of the Tianjin Geological Survey, Ministry of Metallurgical Industry

TITLE: "Uranothorite Discovered in Rare Earth, Niobium, Iron Deposits at Bayan Obo, Nei Monggol, China"

SOURCE: Beijing KEXUE XUEBAO [SCIENCE BULLETIN] in English Vol 25 No 7, Jul 80

TEXT OF ENGLISH ABSTRACT: While studying the constitution of the rare earth, niobium, iron ore at Bayan Obo, Nei Monggol, we discovered a mineral in sand-grain form. It is identified as uranothorite after mineral separation, determination of physical properties, X-ray diffraction with powder method, and electron microprobe analysis. Uranothorite is of the uranorite-thorite group of silicate minerals. It is the first discovery of this mineral in China.

9717
CSO: 4009

AUTHOR: SUN Haifang [1327 3189 5364]

ORG:, None

TITLE: "Sea Oscillation"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 2, Feb 80 pp 1-2

ABSTRACT: Using the experiences of 2 Japanese cargo ships sailing on the Pacific Ocean in Mar 33 and 17 Feb 59, this paper describes free oscillation of sea water caused by earthquake or volcanic eruption of the coastal region or the ocean floor. The wave [tsunami] has a vertical vibration characteristic, measuring only several km, but having a fast speed of about 1,400 m /sec. In China, ocean oscillation was recorded on 13 Feb 18 when a 7.5 earthquake occurred on the ocean floor (117° EL and 23.5° NL) near Nanwo of Guangdong. In recent years, mild oscillation also occurred in Bohai during the 7.4 earthquake in Bohai and again during the 7.8 earthquake in Tangshan. To date, there has been no record of destruction caused by ocean oscillation in China, however.

AUTHOR: MAO Fuping [3029 4395 1627]

ORG: None

TITLE: "Laser Communication on the Sea"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 2, Feb 80 p 31

ABSTRACT: When a ship is sailing on the sea, there is a need of communicating with the land regularly. At present, radio wave is used for that purpose, but it is not very good in orientation, secrecy, or resistance to interference. Laser provides the condition to make a communication equipment better than radio. The paper includes drawings depicting the theory of laser communication on the sea and a laser communication equipment. The equipment is said to be like telescope, weighing only 10.4 kg. Under the condition of 10.6 km of visibility, communication with this equipment may reach 6 km.

AUTHOR: LIN Jianping [3651 1696 1627]

ORG: None

TITLE: "A Tragedy Caused by Mercury"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 4, Apr 80 pp 10-11

ABSTRACT: This paper relates the events occurred in Minamata, Japan in 1950 leading to the discovery of the Minamata Disease, a syndrome caused by methyl mercury poison. The paper proceeds to explain that when mercury containing waste of industry, agricultural drugs, and pharmaceuticals enters the atmosphere, the soil, and the water, the ocean finally receives the mercury. At present, more than 10,000 tons of mercury enters the oceans every year. After mercury is settled on the ocean floor, it is released at a rate of 1 percent per year and under the action of microorganisms, it is converted into methyl mercury to form a secondary pollution of the sea water. Methyl mercury is even more poisonous than mercury. The most effective method of preventing Minamata Disease is to treat the liquid waste that contains mercury. There is also the microorganism method, but the paper does not elaborate on it.

AUTHOR: LIN Yujie [2651 5940 2638]

ORG: None

TITLE: "Report of a Visit to a Deep Submarine Carrier"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 4, Apr 80 pp 21-22

ABSTRACT: This paper reports the author's trip to Dongfang Shipbuilding Plant to participate in the trial run of Bohai No 1 deep submarine carrier. He recalled what chief engineer Li Gong [7812 6300] told him a year previously "deep submarines are small and very maneuberable but cannot carry sufficient supplies; therefore, a carrier ship is urgently needed." Aside from a story-like report of the carrier's maiden voyage, the paper also includes a drawing depicting the major constituent parts of the carrier and an offhanded description of the communication system between the carrier and the deep submarine after the latter is launched into the ocean depth.

AUTHOR: LIN Jianping [2651 1696 1627]

ORG: None

TITLE: "Mercury--A Monster Feared by Marine Organisms"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 5, May 80 pp 3-4

ABSTRACT: Mercury pollution of the ocean damages men mainly through eating contaminated seafood. This paper explains the way mercury in the sea enters the food chain. Like a monster, the mercury content of seawater seeps into the planktons, the fish and shellfish, the seabirds and sea animals and collects in the bodies of these organisms to reach a density several hundred times that of the sea water. If the methyl mercury content of the fish or seabird is transferred to a man, it will endanger his health or cause Minamata Disease. Most countries set limits of mercury content of fish or shellfish being sold on the markets. They are 0.5 mg/kg in USA and Canada and 1 mg/kg in Japan and Sweden.

AUTHOR: ZHENG Jinshu [6774 6855 2885]

ORG: None

TITLE: "Using Poison to Attack Poison for Pollution Control--Antidote Phenomenon"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 5, May 80 p 5

ABSTRACT: In a certain place of Southwest China, there is a plant using mercury as the raw material. Under the sunlight, pearl-like quicksilver may be seen on the roads near the plant. This is, without doubt, a region of mercury pollution. The inhabitants are happy and healthy, and no one is suffering from Minamata Disease, however. Research disclosed the fact that the mercury content of the hair of local residents reaches 5-10 mg/kg and that of the workers of the plant is 10 mg/kg. The soil and the water of the region contain higher than normal selenium, which interferes with the physiological action of mercury in the organic body. When 10 mg/kg of mercury was fed to experimental mice, all died, but when 0.5 mg/kg of selenium was added to the same dose of mercury, not a single mouse was poisoned. The paper also mentions other antidote relationships, including gold and copper, calcium and lead, lithum and sodium, etc.

AUTHOR: TANG Zhiba [0781 1807 2149]

ORG: None

TITLE: "Hunters on the Sea"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 5, May 80 pp 6-7

ABSTRACT: Submarine hunters are a kind of small, near sea antisubmarine equipment. One of these weighs only 100-800 tons and can do 18-30 knots. It is easily operational in a storm and can sail continuously 1000-3500 nautical miles without stopping. It uses sonar as its eyes to look for submarines. Its legs are usually a high speed diesel engine. Its fist, i.e. its antisubmarine weapon includes antisubmarine guided missile, antisubmarine helicopter, torpedoes, rockets, etc. There is no mention in the paper of names of the countries that own these boats.

AUTHOR: WU Zhankuo [6762 1455 7059]

ORG: None

TITLE: "What Hit Shanfeng to Cause the Explosion?"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 6, Jun 80 pp 1-2

ABSTRACT: On 1 Jul 78, at noon, when the 13,000 ton dredge, Shanfeng, was about to finish its work at sea just outside of the estuary of the Yangzi, there suddenly was an undersea explosion. The dredge was damaged, but no one was hurt badly. It was suspected that the suction rod of the dredge may have hit an underwater mine. Many of these were known to have been laid in the region of the sea by Japan, the USA, and the Kuomintang during WWII and just before the liberation. A Japanese ship was sunk in Jul 44 and a Chinese ship in 1948 by these leftover mines. In 1950, mine sweepers uncovered 7, but they all appeared to be too corroded to be operative, but one MK-26 picked up in 1965 appeared to be undamaged. In view of the fact that the shell fragments on the deck of Shanfeng are 2mm in thickness and having shining inner wall, it is believed that the culprit must be a MK-26. Obviously, many of the 600-700 mines laid by the USA in various points of the Yangzi must still be operative.

AUTHOR: LI Jinglong [2621 2529 7893]

ORG: None

TITLE: "On Underwater Welding"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 6, Jun 80 pp 4-5

ABSTRACT: Underwater welding is needed for emergency repair of ships, salvaging, bridge construction, building large oil drilling platforms, laying underwater pipes, etc. Difficulties of underwater welding include darkness, pressure, and fast cooling speed, etc. There are now 3 types of underwater welding techniques. The most primitive is the wet method, which is safe and inexpensive, but air bubbles may easily occur to cause it unsuitable for welding important structures. The second is the local dry method, using inert gas in a cover. The humidity often causes the cover to be too cloudy for the welder to see. The third is the dry method, using a sealed and pressurized chamber, with all of the water in the chamber pumped out. With this method welding is possible in a depth of 100-300 m, with the quality almost as good as on land. The cost is very great, however. One such chamber in Japan has a price tag of 10 billion.

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AUTHOR: LI Zhizhang [2621 1807 4545]
XIAO Yiyong [5135 1355 7167]
LOU Fenli [2869 5358 7787]
JIANG Erdong [5592 1422 2639]
YANG Youzhi [2799 0645 1807]

ORG: None

TITLE: "Gas Tuftriding with Water-containing Urea (A Study to Improve the Working Life of Cold-forging Hex Nut Die)"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 1-12

TEXT OF ENGLISH ABSTRACT: From working and failure conditions of the cold-forging hex nut die, a study using water-containing urea to tuftride the die to improve its working life is made. It shows that the life of Cr_{12}MoV dies is improved from 60,000~80,000 nuts per die of ordinary treated but non-tuftrided to 330,000~485,000 nuts per tuftrided. This is discussed qualitatively on the basis of optical-, electron-microscopic and ion-probe analyses. Due to the existence of compounds of carbon, nitrogen and oxygen in surface layers formed

[Continuation of ZHEJIANG DAXUE XUEBAO No 1, Mar 80 pp 1-12]

in the process of water-containing urea tuftriding, the hardness and toughness of the dies are increased, the coefficient of friction is decreased, the formation and expansion rate of "indentation" on the working surfaces of the dies are reduced, and hence the working life of the dies is prolonged.

AUTHOR: MAO Zhiyuan [3029 1807 6678]
HUANG Lanzhen [7806 5695 3791]
WANG Yuejun [3769 2588 0689]
WANG Fupei [3769 3940 1014]

ORG: None

TITLE: "Thin Depth Gas Carbonitriding for Ferrule of Bite Fitting"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 13-23

TEXT OF ENGLISH ABSTRACT: This paper discusses the thin depth (0.03-0.05 mm) gas carbonitriding process for a thin wall of ferrule, in which friethanalamine liquid drops were fed into a reformed shaft furnace. The ferrules were carbonitrided at 800°C for five minutes which was followed by oil quenching. After tempering at 180°C for one hour, the surface hardness thus obtained was approximately Hv 800. Since the carbonitriding temperature is relatively low, the distortion of the ferrule is very small with the change in diameter of the ferrule less than 0.03 mm. After treatment, the ferrule is very tough with more austenite on its surface and less martensite in its core.

AUTHOR: None

ORG: Separate Engineering Research Group, Department of Chemical Engineering

TITLE: "The Determination of Solubility for Carbon Monoxide in Absorbent of Cuprous Aluminum Tetrachloride-toluene"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 24-37

TEXT OF ENGLISH ABSTRACT: The solubility for carbon monoxide in composition of absorbent was determined by a flowing-deabsorbing method at a temperature of 20-50°C and at the partial pressure of the carbon monoxide at 0.05-1 atm. The relations between solubility of carbon monoxide and pressure, temperature and compositions of the absorbent are obtained by the following expression:

$$V_{co} = \frac{[(109.0-1.44^{t})^{P} + 1.274^{t} - 96.29][1 + 0.624^{exP}(\frac{3710}{273+t} - 12.03)]P_{co}}{0.624[1 + P_{co} \exp (\frac{3710}{273+t} - 12.03)]}$$

The maximum deviation of the evaluated value is within the range of 3.35 percent and the average error is within the range of 1.89 percent.

AUTHOR: XU Dingrong [6079 0002 2837]
QIAN Xiangdong [6929 0686 2639]
QIU Derang [5941 1795 6245]
LU Qiongyan [0712 8825 1280]

ORG: None

TITLE: "Extraction Spectrophotometric Determination of Gallium in Stone Coal"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 38-47

TEXT OF ENGLISH ABSTRACT: To meet the need of analysis of gallium in stone coal abundant in our province, the improvement of the extraction spectrophotometric determination of gallium with Rhodamine B was investigated. The proposed method utilizes a small amount of sample and it is fused with the alkali directly (without the demand of ignition to remove carbon). Moisten the melt with hydrochloric acid and evaporate the solution to dryness. Transfer the residue into a colorimetric tube with hydrochloric acid (5.0-5.5 N). Add the titanium trichloride and Rhodamine B respectively and extract it into a mixed solvent (benzene and ether). Then the absorbence is measured. This method is relatively easy, rapid and sensitive and is applicable to the determination of 0.5～50 PPM gallium. For a sample containing 0.001 percent gallium the relative error is ±10 percent.

AUTHOR: None

ORG: The Ev Tester Research Group, Department of Optical Instruments

TITLE: "The Ev Tester for the Automatic Exposure Control Camera"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 48-56

TEXT OF ENGLISH ABSTRACT: Some designing problems and methods concerning the Ev (exposure value) tester for automatic exposure control camera are discussed, and the principle and essential elements of the photo-electronic type which is used in the present design are detailed. Based on the analysis of foreign-made automatic cameras and photo-electronic type exposure meters, the research groups investigated and calculated the light source of this tester. Finally, the calibrated results are given.

AUTHOR: LI Yajun [2621 0068 0689]

ORG: None

TITLE: "A Graphical Method to Solve the Eigenvalue Equations of the Thin-film Optical Waveguide"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 57-64

TEXT OF ENGLISH ABSTRACT: In this paper, a graphical method to solve the eigenvalue equations of the thin-film optical waveguide is proposed. This method can be applied to the thin-film optical waveguide of arbitrary parameters.

The eigenvalue equation of the TE mode of one-dimensional waveguide stands; it is a transcendental equation and for its solution the author introduces two dimensionless parameters, ξ and η. The equation is then transformed into a system of two equations. The former is a set of straight lines and the latter is a family of curves. The point of intersection of straight and curved lines gives the solution to the eigenvalue equation.

To the designers of integrated optical circuits it is important to know the

[Continuation of ZHEJIANG DAXUE XUEBAO No 1, Mar 80 pp 57-64]

dispersive character of the waveguide. Hence the solution between the effective index of refraction and the dimensionless parameter of the waveguide is derived. This relationship is represented by a circle in the Cartesian coordinates. Through the geometrical relation furnished by this circle, it is very easy to describe the characteristic curves of dispersion of the waveguide. The process of drawing the dispersive curve is shown. Also shown is the TE mode dispersive characteristics derived from the graphical method in this paper.

The eigenvalue equation of the TM mode of one-dimensional thin-film optical waveguide can also be solved by the method similar to that of the TE mode. The results are also given in this paper.

In conclusion, the graphical method shows itself as a useful auxiliary means of interpreting the thin-film optical waveguide. Through the analysis of the geometrical relation, the author has also obtained the explicit solution of the cut-off wavelength of the TE and TM modes as shown.

AUTHOR: ZHENG Zengrong [6774 1073 2837]
XIN Xuegeng [6580 1331 5087]
BAO Guangxiang [0545 0342 4382]

ORG: None

TITLE: "The Time Mark Generator of Solid Luminescent Diode"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 65-70

TEXT OF ENGLISH ABSTRACT: An integrated design of a time mark generator with high precision, high stability and high frequency was suggested. Obtained from the quartz crystal oscillator through the dividing network system as a driving source, the use of the GaAsP solid luminescent diode as the pulse light source and the use of the signal have advantages over other methods (mechanical, neon light tubes, discharge sparkling, etc.). These advantages are: lighter in weight, smaller in size, better in anti-seismicity and less driving power. Because the luminescence wavelength coincides well with the wavelength peak of the film sensitivization curve, the time mark frequency is very high (to 30 kc/sec) and more stable. This generator is designed especially for the slit mode high-speed camera, and it can also be used for other synchro-cameras.

AUTHOR: XU Xing [6079 5281]

ORG: None

TITLE: "Calculating the Critical Speed of a Rotating Shaft by the Finite Element Method"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 71-82

TEXT OF ENGLISH ABSTRACT: A calculation of the critical speed of a rotating disk and shaft system is obtained by FEM. The portions of disk and shaft of variable sections are described approximately by conical portions respectively. The displacement in the element is interpolated by a three-order polynomial function. In the calculation, the gyroscopic moment of the disk and shaft is taken into consideration. As for the vanes (straight and torsional), a suitable simplification is made. The influences of shaft shear and the oil film rigidity of the bearing are neglected, and the bearing surface is considered rigid.

This paper discusses a suitable method by which to calculate the critical speed of complex and multi-span rotating shafts. The computer program input

[Continuation of ZHEJIANG DAXUE XUEBAO No 1, Mar 80 pp 71-82]

requires only the information of constants of the material properties, the dimensions of elements, the number of elements and nodal points. Therefore, it is convenient to use. This method enables us to calculate the lowest critical speeds and modes.

AUTHOR: MAO Xinqiang [3029 0207 1730]

ORG: None

TITLE: "OTF and Revolution of the Rotating-Mirror Camera Framing at High Speed"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 83-92

TEXT OF ENGLISH ABSTRACT: This paper discusses how the optical transfer function (OTF) of the rotating-mirror camera framing at high speed, scanning with a diamond or rectangular-shaped aperture, has been computed for out-of-focus images. The results are analyzed and compared, and taking the transfer function into consideration, the revolution of the camera which contains film is briefly discussed.

AUTHOR: GUAN Neiming [7070 0355 2494]

ORG: None

TITLE: "Calculation of the Capacity of Rectifier Transformer in T-connection"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 93-112

TEXT OF ENGLISH ABSTRACT: This article deals with the principle of operating T-connected transformers, and also presents the derivation of the formulae for calculating the capacity of these transformers especially designed for rectifier operation, assuming that the rectifier circuit is in ideal operating condition. It concludes with the corrections made on the formulae for calculating the no-load average voltage U_{do} taking into consideration the factors which have hitherto been neglected.

AUTHOR: CHEN Daoqi [7115 6670 3823]

ORG: None

TITLE: "On Opial Inequality"

SOURCE: Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 80 pp 120-124

TEXT OF ENGLISH ABSTRACT: HUA Luogeng [5478 5012 1649] has proved the generalized Opial inequality:

$$\int_0^a |y(x)|^{\ell} \cdot |y'(x)| dx \leq \frac{a^{\ell}}{1+\ell} \int_0^a |y'(x)|^{1+\ell} dx,$$

where $y(x)$ is an absolutely continuous function on (o,a), $y(o) = o$ and ℓ is a positive integer.

Hua conjectured that the above inequality might hold for all positive real numbers ℓ. We have proved this conjecture is true.

AUTHOR: LIU Hua [6424 2901]

ORG: None

TITLE: "The Huangpu New Harbor Under Construction"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 4, Apr 80 pp 1-2

ABSTRACT: The Huangpu New Harbor is a new construction project of the Huangpu Harbor Affairs Management Bureau of the Ministry of Transportion. Premier ZHOU proposed in 1973 that the appearance of China's harbors must change within 3 years, and the Command Department of Huangpu New Harbor Construction was established the same year with almost immediate ground breaking. The first stage of the project was completed in the end of 1975. Now, on the eastern shore of the Pearl River estuary, the harbor has 5 booths for mooring ships of the 20,000 ton class and additional mooring spaces measuring more than 1,000 m in length. In addition, there are one wharf for oil tankers only, a railway station, and a 14 plus km of special rail line. Grain elevators of a capacity of 300,000 tons and more than 70 loading equipment of all sizes are now all operational. The second stage currently under construction will include 2 container docks measuring 470 x 380 m each. A photo of the grain elevators and another of the second stage engineering project are included in the description.

AUTHOR: YANG Baogen [2799 1405 2704]

ORG: None

TITLE: "Nuclear Electromagnetic Pulse Effect--A Strange Occurrence in Hawaii"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 4, Apr 80 pp 38-40, 33

ABSTRACT: On 9 Jul 62, the lighting transformer on the island of Oahu in Hawaii was suddenly burnt up by a surge of power of unknown origin to cause the lights of 30 streets on the island to be out of commission, and at the same time, several hundred burglar alarms on the island of Honolulu all suddenly went off while the circuit breakers all flipped like a corn popper. Following investigation, it was known that these events were caused by a high atmosphere nuclear explosion test conducted by the USA government in the Johnston Island of the Pacific Ocean. This nuclear explosion, 400 km above the ground surface of an equivalent of 1,400,000 tons of TNT caused damage to electrical installations on the ground surface and the solar batteries and electronic instruments on several orbiting artificial satellites to be prematurely out of commission. Previously, in 1960, a high altitude nuclear explosion in the USSR had caused radar and long distance communication systems to be not operational for as long as 24 hours. This paper describes the incident in Hawaii and the theory and the aftereffects of such events.

AUTHOR: ZENG Xinruo [2582 6580 5387]

ORG: Research Institute of Sonics, Chinese Academy of Sciences

TITLE: "Ultrasonic Microscope"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 5, May 80 pp 3-4

ABSTRACT: Optical microscopes can be used to observe light permeable objects or the surface of opaque objects. Electron microscopes can also be used to observe translucent objects while scanning electron microscopes can only be used to observe the surface of opaque objects. For the purpose of searching for a new technique of a capability of observing the internal structure of opaque objects, the ultrasonic microscope was born. Ultrasound has good penetration ability and has long been used to test internal defects of metal parts or concrete members. In medicine, it has been used to detect disorders of internal organs. But, in these applications, the millimeter ultrasonic wave is used. The newly created ultrasonic microscope uses micromillimeter wave and the length of the sonic wave in the most advanced ultrasonic microscope may reach 0.5 μmm or shorter, with a differentiation comparable with optical microscopes. This paper explains the work principle and the application prospects of ultrasonic microscopes.

AUTHOR: YANG Baogen [2799 1405 2704]

ORG: None

TITLE: "A Strange Rock in the Forest"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 5, May 80 pp 5-7

ABSTRACT: This paper starts with a fictional telephone report of a patrolman to his commanding officer about his discovery of a strange rock in the jungle. Two horns grew out of the rock right under his eyes. He was told to bring the rock to the headquarters. When it arrived, the horns had retreated and it looked just like an ordinary rock, but after a little while, a pair of horns gradually extended from the rock and stayed out for 5 minutes. Inside the rock, it was discovered, there was a tape recorder and analysis of the tape revealed that all conversations; movements of tanks, etc. in the visinity of the rock in the jungle had been recorded onto the tape. The rock is in fact an automatic detective station gathering intelligence by itself. In 1973, the paper claims, the USA had dropped from the air many such automatic intelligence devices disguised as rocks, briks, or stumps of rotten wood to gather and transmit intelligence data from behind the enemy lines in Vietnam. Process of dropping such devices, data gathering, and data transmission and reception are briefly described.

AUTHOR: CHEN Hongxun [7115 1347 8113]

ORG: None

TITLE: "Transportation Vehicles in a Tube"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 5, May 80 pp 18-19

ABSTRACT: In the early 1970's, the USA and Japan cooperated in an experiment to construct a pneumatic tube to transport merchandise containers. This type of tube transportation system requires a high initial investment. In the designing process, considerations must be given to preventing obstructions from occuring midway in the tube and to the method of retrieving the container if any accident should occur. Following prolonged experimentation, the tube is now operational [The paper does not mention the location of the experiment.] Most recently, the New Japan Iron and Steel Company constructed a tube line to deliver lime in containers at its second steel mill. The line has a capacity of 20,000 tons per month, operating 500 hours. The tube measures 609.6 mm in diameter and 1.5 km in length. A train of 2 containers carrying 500 kg is dispatched every 45 sec, to reach its destination in 6-8 sec. There is one air compressor and 12 auxiliary compressors to provide the air pressure. The paper suggests that the research and application of this technology may contribute to China's modernization.

AUTHOR: ZHANG Yongnian [1728 3057 1628]

ORG: None

TITLE: "Further Discussion on the Science of Chimneys"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 5, May 80 pp 31-36

ABSTRACT: After the paper, "The Science of Chimneys" was published in the journal, the editorial department has received many letters from readers asking questions on matters concerning chimneys that were not touched or not sufficient explained in that paper. This paper attempts to answer these questions. The questions include the cause of leaks in chimneys, the reason for a chimney to leak sometimes and not leak at other times, the method and structure of dust trapping devices installed in the chimney, and the structure and method of installing automatic valve to guarantee an upward draft.

AUTHOR: HAN Daxing [7281 1129 2502]

ORG: None

TITLE: "For Controlled Growth of a Single Atom Layer--Successful Research and Manufacture of China's First Molecular Beam Epitaxy [MBE]"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 6, Jun 80 pp 1-2

ABSTRACT: In the past decade, MBE technology has grown into a very active field, and commercial equipment is being sold by the USA, England, and France. Chinese scientists began research and designing in 1974, and the first MBE equipment made in China has been successfully completed in 1979. This paper explains the technology briefly, including its advantages over gaseous epitaxy. The importance of epitaxy in manufacturing semiconductors forms the first section of the paper.The paper also includes a drawing of the super-vacuum portion of the MBE equipment, and another drawing [not a photo] of the MBE equipment made in China. But, there is no mention of the organization that succeeded in making the first MBE equipment, nor the names of scientists who participated in the project.

AUTHOR: HAN Jie [7281 0512]

ORG: None

TITLE: "What is an Aspphyxiation Bomb? Introducing the Fuel Air Bomb"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 6, Jun 80 pp 22-23

ABSTRACT: As a matter of fact, the paper says, the USA has long been studying a weapon called the "fuel air bomb." Since 1967, it has been repeatedly used on battlefields. Aside from TNT, etc. there are many other combustible materials, such as easily inflammable solid powdery dust of aluminum, coal, etc. when it is suspended in the air, it will cause explosion when the condition is suitable. The fact that a mixture of certain inflammable gas and air in a given ratio will explode has been known long time ago from experience of coal and oil mining accidents. This is the theory behind the fuel air explosive (FAE) which began to appear in the 1960's. This paper discusses the method of making such bombs and their advantages and shortcomings.

AUTHOR: LIU Shaoqiu [0491 4801 3808]

ORG: None

TITLE: "Intercontinental Ballistic Missile"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 7, Jul 80 pp 37-39

ABSTRACT: Intercontinental ballistic missiles began to be developed after the WWII on the basis of the V-2 rockets of Germany. By 1978, the USSR had 1,400 intercontinental ballistic missiles with 4500 of these having nuclear warheads; the USA has 1054, with 11,000 nuclear warheads [?]. To date, intercontinental ballistic missiles may be divided into 4 generations. The history of development of intercontinental ballistic missiles is briefly told. The fact that a minute miscalculation at the launching site may cause a thousand mile mistake from the target is discussed. The paper begins with an explanation of intercontinental ballistic missiles, their trajectory, the passive segment of the flight, the altitude of the flight, the reentry, the maximum speed, etc.

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END

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SCIENCE AND TECHNOLOGY

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BRIEFS

COMPUTER OPERATION MEETING IN HOHHOT--In order to make full use of all computers in China, the China Computer Society and the China Electronics Society recently held a national experience exchange meeting on the operation and maintenance of computers in Hohhot municipality. Attending the meeting were some 200 cadres from 160 units throughout the country. Some noted professors and experts also attended this meeting. Ting Mao, chairman of the standing committee of the Regional People's Congress, Chen Binyu, vice chairman of the Regional People's Government, and Wang Zaitian, vice chairman of the Regional CPPCC Committee, attended and received all representatives at the meeting. [Hohhot Nei Monggol Regional Service in Mandarin 1100 GMT 22 Sep 80]

HUNAN SCIENCE, TECHNOLOGY ASSOCIATION--The third congress of the Hunan Provincial Science and Technology Association was held for 6 days and ended in Changsha on 23 September. The congress elected the third committee of the Provincial Science and Technology Association. Professor (Sun Benwang), vice president of the National Defense Science and Technology University, spoke during the congress. Leading comrades of the Provincial CCP Committee and Provincial Government attended the closing ceremony and Liu Fusheng spoke. [Changsha Hunan Provincial Service in Mandarin 1100 GMT 23 Sep 80]

CSO: 4008

MEDICAL EXPERIMENTS IN LUNG TRANSPLANTS SHOW IMPROVEMENT

Beijing BEIJING RIBAO in Chinese 8 Aug 80 p 1

[Article: "A Dog With a Heterologous Lung Survived 390 Days"]

[Text] Reporters Chen Xuhao [7115 4872 6275] and Wu Yafang [0702 0068 5364] report that in the laboratory of the department of chest surgery of Beijing Municipal Institute of Tuberculosis there is a dog named Heihua [Black Spot] who has a left lung that has been transplanted from another dog. Up to yesterday, the dog had survived 122 days [since the operation]. Previously, a black dog had survived 390 days but died on 31 May of idiopathic pneumothorax of the right side; that was the highest domestic record. The surgeon who performed the lung graft operation on the 2 dogs is the chest surgery specialist Xin Yuling [6580 5148 7881], Deputy Chief of the institute. This is a new achievement of the work of Xin Yuling and his colleagues in search for successful human lung transplant.

The purpose of performing lung transplant on dogs is to benefit mankind, to break the barrier in lung transplant in the human body which would save victims of lung cancer and other serious pulmonary diseases. In recent years many physicians here and abroad have struggled to accomplish this. Early in 1958, Doctor Xin began the work of lung graft on dogs, but due to many reasons, especially to the 10 years of riot of the "gang of four," the experimental activity was forced to discontinue for a whole of 20 years. After the gang of four was smashed, Doctor Xin and colleagues began this research project once again. Doctor Xin exerted a great deal of effort in the lung graft work, and encouraging results were also obtained.

The group of dogs on which lung transplant was performed survived only several days on the average, in 1958. In 1978, the survival period of the group of dogs averaged a few more than 10 days. Following the improvement on the method of anastomosis of pulmonary vessels and the postoperative treatment procedure, the 1979 group survived an extended period of more than 50 days, on the average. At present, the lung transplant experiments of Doctor Xin have caught up with the international level.

On the basis of the relatively better results, on 13 Jan 79, Doctor Xin performed China's first human lung transplant. On 17 Oct of the same year, a second case was performed. In these 2 cases, the operation was successful, but due to lack of effective anti-rejection measures, serious rejection reactions occurred on the 7th and 12th days respectively and the transplanted lungs had to be removed to save the life of the 2 patients. At present, Doctor Xin Yuling is moving forward in the world-wide difficult subject of human lung transplant with renewed confidence.

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CSO: 4008

MAGNETOTHERAPEUTIC EYE GLASSES REQUIRE FURTHER RESEARCH

Beijing GUANGMING RIBAO in Chinese 18 Aug 80 p 1

[Article by Zheng Jiang [6774 3068]: "Magnetotherapeutic Eyeglasses Are Not Suitable for Large Scale Extension at Present"]

[Text] Since the end of last year, after some newspapers (including GUANGMING RIBAO) published the news of successful research on magnetotherapeutic eyeglasses in Beijing, there are now some 20 factories operated by schools in Beijing that are manufacturing magnetotherapeutic eyeglasses. Advertisements for these eyeglasses may be seen everywhere on the streets and alleys. The sale has reached as many as several hundred thousand pairs.

According to the related department, for the purpose of applying magnetotherapy, the eye department of Hunan College of Medicine Hospital carried out an experiment in 1976 on the effect of a magnetic field on the eyes of rabbits. Results indicate that under the action of a relatively strong magnetic field for a long time, turbidity of the crystalline lens of the rabbit eye appeared, mostly in the front portion of the lens, in the shape of small dots in morphology in most cases. Within the limit of field strength in the laboratory, turbidity of the vitreous body was not observed. In the weak magnetic field group--below 700 gauss, there was not a single case of changes in the crystalline lens of eyes of rabbits. It was, therefore, believed that weak magnetic field for a short period of time may be applied clinically, but strong magnetic field for a prolonged period of time can damage the human eye.

The related department believes that these magnetotherapeutic eyeglasses remain, at present, in the experimental and observational period. The period of experimentation is still short, and the accumulated technical data not sufficient for technical certification. Although, in the outpatient magnetotherapeutic experiment of more than one year, no side effects have been observed to date, but whether there is side effect in long term application remains to be studied and investigated further.

For the general masses, especially the young and healthy persons, magnetotherapeutic eyeglasses are not suitable for large scale distribution at present.

The related department points out that as a medical therapeutical device, magnetotherapeutic eyeglasses have not yet been certified. They must not be manufactured at random or used carelessly because if the wearer is harmed, there would be no way to pin down the responsibility.

The wearer or some units may make the eyeglasses themselves and the materials and parameters they use may not always be suitable. Even the magnetotherapeutic eyeglasses designed by some hospitals might not always be scientific. Some parameters are still being tried, studied, and improved. If magnetotherapeutic eyeglasses are improperly used bad results may be created. The phenomenon of crystalline lens turbidity observed in the rabbit eye experiments may even occur. As a matter of fact, due to lack of scientific knowledge, some people one-sidedly believe that the stronger the magnetic field is--the longer the duration of action is, and, therefore, the more effective the eyeglasses will be. They make for themselves electromagnetic eyeglasses of several thousand gauss, or, unlimitedly increase the action time and individual cases of serious result of induced cataract have occurred. They are complaining about the anarchy situation in the production of magnetotherapeutic eyeglasses, and some irregular and careless method of manufacturing the glasses just to make a profit. These glasses are sold in large batches on the marketplace irresponsibly. This is extremely improper and must be stopped at once. The sick must never "look for a cure so urgent that he forgets to think". Treatment must be carried out under the concrete guidance of a physician's strict and solemn clinical observation. A related physician of the eye department pointed out that as far as the treatment effect of magnetotherapeutic eyeglasses is concerned, it is demonstrated mainly in the capability of the eyeglasses to improve the eyesight of some wearers while the extent of improvement varies with the degree of nearsightedness and the age. However, the eyeglasses cannot change the degree of light inflection and the cure also cannot be stable without persistent application to stabilize the effect. There are many ways of treating nearsightedness and magnetotherapeutic eyeglasses are only one of these. It is not true, as some advertisements and newspapers say, that these eyeglasses are effective for true or pseudo nearsightedness. A scientific and factual perspective is, therefore, necessary in the matter of magnetotherapeutic eyeglasses.

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CSO: 4008

QINGHAI SCIENTIFIC TECHNICAL ASSOCIATION HOLDS THIRD CONGRESS

SK020633 Xining Qinghai Provincial Service in Mandarin 1100 GMT 1 Sep 80

[Excerpts] The Third Congress of the Qinghai Provincial Association of Science and Technology was ceremoniously held on the morning of 1 September at the auditorium of the provincial guest house. Attending the opening ceremony were leading comrades of the provincial party committee, the Standing Committee of the provincial people's congress, the provincial people's government, the provincial CPPCC committee and the provincial military district including Zhang Guosheng, (Huang Busi), Song Lin, Liu Chengyun, Ma Wanli, (Shang Baian), (Ma Letian), (Sun Yaoliao) and (Zhu Yan). Representatives of the provincial trade union council, the provincial women's federation, the provincial CYL committee and the provincial federation of literary and art circles attended the congress and extended their congratulations.

Liu Chengyun, vice chairman of the Standing Committee of the provincial people's congress and active chairman of the provincial association of science and technology, presided over the opening ceremony. (Kong Xiang), vice chairman of the provincial association of science and technology, delivered an opening speech.

(Sun Zhaohuan), secretary of the secretariat of the China Scientific and Technical Association, made a special trip to extend greetings to the congress and delivered a speech. Song Lin, Standing Committee member of the provincial party committee and deputy governor of Qinghai Province, also spoke at the opening ceremony. In his speech, he emphasized the importance of science and technology. He urged leaders at all levels to pay attention to science and technology, improve the party's leadership over the work, further implement the party's policies on intellectuals and bring the role of scientists and technicians into full play in achieving the four modernizations.

CSO: 4008

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

BRIEFS

HEILONGJIANG SCIENTIFIC AND TECHNOLOGICAL ASSOCIATION--Eighteen delegations from various prefectures and municipalities and specialized associations in Heilongjiang Province, a total of 1,000 people, arrived in Harbin on 15 August to attend the Second Provincial Congress of Scientific and Technological Associations. Wang Jinling, deputy governor of Heilongjiang Province and deputy council director of the provincial agricultural society, and responsible comrades of the provincial scientific and technological association, received the delegations at the station. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 15 Aug 80 SK]

ANHUI SCIENTIFIC FILES CONFERENCE--The First Anhui Provincial Work Conference on Scientific and Technical Files, which was jointly sponsored by provincial economic capital construction, scientific and technical, and agricultural commission sand archives bureau was held in Hefei from 28 August to 1 September. Responsible persons of provincial, prefectural, municipal and county departments and offices concerned and representatives of institutes of higher learning and major plants, mines and enterprises, totaling 405 people attended the conference. (Yuan Zhen), Standing Committee member of the provincial CCP committee, spoke at the con conference. (Huang Xiucheng) and (Wang Shugang), deputy directors of the provincial archives bureau, conveyed the guidelines of the national work conference of archives at or above provincial levels respectively. They also put forth measures for improving the work in Anhui. The conference participants stressed the importance of the work on scientific and technical files for the building of the four modernizations and called for strengthening leadership over the work. [Hefei Anhui Provincial Service in Mandarin 1100 GMT 10 Sep 80 OW]

BEIJING SCIENTIFIC PERSONNEL--Beijing, 15 Sep (XINHUA)--According to a survey by the Chinese Academy of Sciences, 88 percent of the scientific personnel in the Beijing area who have won rewards for major scientific and technological achievements during the 1978-1979 period fall in the 36-50 age bracket. The average monthly income for these personnel ranges from 56 yuan to 70 yuan. To give greater play to their role, special attention must be paid to improving their working and living conditions, the report stressed. [Beijing XINHUA Domestic Service in Chinese 1255 GMT 15 Sep 80 OW]

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Shanghai Institute of Silicates, Chinese Academy of Sciences (207)

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CSO: 4008

Architectural Engineering

AUTHOR: LI Guohao [2621 0948 6275]

ORG: None

TITLE: "Bending and Twisting of Box Girders with Deformable Trapezoidal Cross Sections"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 1-13

TEXT OF ENGLISH ABSTRACT: Box girders of deformable trapezoidal cross sections are widely used in bridge engineering. In this paper, for the purpose of facilitating the stress and vibration analysis, differential equations of horizontal bending and twisting for statical and dynamical loadings are derived. Formulae for normal and shearing stresses are also given in detail. The torsion of indeformable cross sections and the deformation of deformable cross sections, as well as the relation between them, are analyzed. Approximate methods for solving the differential equations are discussed.

AUTHOR: XIANG Haifan [7309 3189 1581]
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ORG: None

TITLE: "A Practical Method for Earthquake-Resistant Calculation of Continuous Arch Bridges"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 14-32

TEXT OF ENGLISH ABSTRACT: In this paper a practical method for earthquake-resistant calculation of continuous arch bridges frequently encountered in the earthquake regions of our country is proposed as an extension of the research of the earthquake-resistant calculation of single span arch bridges presented in a previous paper. The simplified mechanical models are derived from systematic analyses of the dynamic behavior and the laws of response of continuous arch bridges. The earthquake response coefficients of continuous arch bridges are computed with the aid of "MRC-3" and "MRC-4" programs. Finally, the method is applied to an example and the principles of strengthening continuous arch bridges to increase their earthquake-resistance are discussed.

AUTHOR: GU Shaode [7357 4801 1795]
LI Zongrong [2621 1350 3768/1369]

ORG: None

TITLE: "A Study on the Use of Photoelastic Method for the Determination of Stress Intensity Factors K_I"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 33-48

TEXT OF ENGLISH ABSTRACT: A new investigation on the principle involved in the use of the photoelastic method for the determination of stress intensity factor K_I is made. It is proposed that the local stress field at the crack front consists of a singular field and a finite field. The results thus obtained can be applied to cracks under complicated conditions which so far cannot be solved effectively by other approaches. The fundamental equations applicable to photoelastic analysis are herein developed and several appropriate programs of experimental analysis are provided. In addition, a review is made for the five methods of analysis which are in current use in our country and abroad. Analysis is made on resulting errors in some methods as well as the range of applications of these methods. In this paper the "exact solution" method is used to solve the problem of how to reflect the parameter K_I at crack tip

[Continuation of TONGJI DAXUE XUEBAO No 1, Mar 80 pp 33-48]

through the parameters in the "reliable" region. The difficulties in measuring the parameters at crack tip because of "tip blunt" are thus overcome. The validity of the assumptions made in this paper is examined by a practical example with theoretical analytical expressions (using the Westergaard complex stress function) as well as by the analysis of photoelastic experimental results. Finally, the experimental results of a two-dimensional and a three-dimensional problem are utilized for further examination on the method here developed, and this gives further evidence of the effectiveness of the proposed method.

AUTHOR: DING Zuquan [0002 4371 3123]
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ORG: None

TITLE: "Quantitative Determination of Three-Dimensional Displacements and Vibration Using Holographic Interferometry"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 49-62

TEXT OF ENGLISH ABSTRACT: The application of holographic interferometry to the quantitative measurement of two- or three-dimensional displacements and 2-D vibration using the multiple-hologram technique and an overdetermined set of simultaneous equations of the single-hologram technique is studied. The results of the study are presented in the four experiments. In this paper, also briefly discussed are the basic equations, interpretation of fringes, experimental methods and devices of quantitative measurement of holographic displacement. Finally, a method for further improvement and perfection is proposed.

AUTHOR: ZHU Bolong [2612 0130 7893]
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TITLE: "A Study of Hysteretic Curve of Reinforced Concrete Members under Cyclic Loading Taking into Account Local Contact Effects of Cracked Section"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 63-75

TEXT OF ENGLISH ABSTRACT: In current methods for the calculation of the moment-curvature hysteretic curve, there are two basic assumptions concerning concrete in compression:

(a) Cracked concrete, when subjected to compression under reloading, works as if uncracked.

(b) For concrete in compression zone a stress-strain relation for repeated axial compressive cyclic loading is adopted instead of that for reversed loading. Based on the above assumptions, the calculated moment-curvature curve under a large cracked deformation will present a pinching point; however such a point does not exist at the corresponding position in the experimental curve. Due to the influence of secondary moment, the calculated result for

[Continuation of TONGJI DAXUE XUEBAO No 1, Mar 80 pp 63-75]

load-deflection curve errs more than that for moment-curvature curve. If we consider the local contact effects of the cracked section during reloading, the pinching point will disappear from the calculated hysteretic loops.

Based on the test data of local contact effects of the cracked section, we propose in this article a new equivalent concrete stress-strain relation for reversed loading. With the use of this relation, instead of that for repeated loading, good agreement between experimental and theoretical results of hysteretic loops can then be obtained.

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TITLE: "On the Load-Carrying Capacity of Concrete Pavements"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 76-86

TEXT OF ENGLISH ABSTRACT: The load-carrying capacity of concrete pavement under a central load is investigated. The pavement is treated as a rigid-plastic slab of infinitely large size resting on an elastic subgrade. It is shown that due to the presence of axial thrust and the gradual cracking of the section, a plain concrete element can deform significantly without losing its flexural strength. Therefore, redistribution of bending moment in a large plain concrete slab is possible as has been observed in the experiments.

A method for the determination of the position of yield lines as well as the load-carrying capacity is also proposed.

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TITLE: "The Use of a Combined Member-Story Model for Analyzing Earthquake Responses of Tall Buildings"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 87-98

TEXT OF ENGLISH ABSTRACT: In this paper, a member-story model for analyzing the inelastic responses of tall buildings subjected to earthquake excitations is presented. The authors have also derived: (1) the inelastic and geometrically nonlinear stiffness matrix of a member with two rigid zones at its ends, using a one-component model of a member and considering axial, shear and bending deformations; (2) the spatial stiffness matrix with three degrees of freedom for every floor corresponding to two components of displacement and one of rotation considering the interaction of shear walls and frames; (3) the spatial stiffness matrix with six degrees of freedom for every floor corresponding to three components of displacement and three of rotation. In addition,

[Continuation of TONGJI DAXUE XUEBAO No 1, Mar 80 pp 87-98]

the concept of transition stiffness dealing with the turning points of hysteresis loops is also introduced. According to the model mentioned above, a program has been worked out and used in the design of some tall buildings.

AUTHOR: SHEN Rongfang [3088 2837 5364]

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TITLE: "Solution of Transportation Problems by Primal-Dual Algorithm and Its Program"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 99-112

TEXT OF ENGLISH ABSTRACT: In this paper the procedure of computation for the solution of transportation problems by primal-dual algorithm is discussed. Its advantage lies in considerable reduction of the amount of computational work by as much as 50 percent as compared with the conventional algorithm used in solving such problems. A program written in "719" algorithmic language and its explanation is presented in this paper. A technique for remembering the number of positive variables and their positions is adopted in the program, thereby saving a great deal of running time. On a "719" digital computer it takes about 15 seconds to solve a transportation problem with approximately 100 variables including time for printing the answer. For this type of computer over 6000 variables can be admitted. If a program of the simplex algorithm were adopted, it would take more than two minutes to solve the same problem and only

[Continuation of TONGJI DAXUE XUEBAO No 1, Mar 80 pp 99-112]

a few hundred variables could be admitted. In the case of problems with thousands of variables, the primal-dual algorithm will be far more efficient.

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TITLE: "A Study of Traffic Conversion for Flexible Pavement Design"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 113-123

TEXT OF ENGLISH ABSTRACT: This paper presents briefly the research results on traffic conversion for flexible pavement design. Based on a large amount of accumulated data obtained by measurements from roads in our country over a period of many years and by taking the surface deflections as the principal criterion for pavement design, a traffic conversion equation is developed. This equation has been adopted by the revised "Specifications of Highway Pavements Design" in our country.

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TITLE: "XYZ Systemized Architectural Design for Housing Construction"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese No 1, Mar 80 pp 124-143

TEXT OF ENGLISH ABSTRACT: In order to speed up the task of the Four Modernizations, it is deemed necessary to carry out the huge housing construction works by means of fairly advanced industrialized methods. But before commencing with the work of industrialization, it is imperative to provide certain systemized architectural designs with a view of establishing certain criteria of standardized architectural elements so as to form a complete system of plans capable of fulfilling the various housing requirements. The author has made a preliminary study in this respect and has found a series of X, Y, Z combinations with a limited number of basic architectural elements resulting in a large number of housing arrangements capable of satisfying the various up-to-date housing needs.

The author's scheme of design has won the third prize in the Shanghai Urban

[Continuation of TONGJI DAXUE XUEBAO No 1, Mar 80 pp 124-143]

Housing Design Competition and commendatory prize in the National Urban Housing Design Competition in 1979.

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CSO: 4009

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TITLE: "Glauconite in the Sediments of the East China Sea"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 205-217

TEXT OF ENGLISH ABSTRACT: Glauconite in 233 bottom samples from the shallow portion of the East China Sea were studied. In this region, most glauconite is in various forms of pellets, but some is found in cavities of foraminiferal tests, ostracod shells, molluscal shells and bryozan zooecial chambers. The color of the glauconite varied considerably, ranging from black to light yellow. Most grains are black to dark green, some are yellow-gree, and a few are light yellow. The surface pattern of the glauconite grains is either shallow sutures

[Continuation of DIZHI KEXUE No 3, Jul 80 pp 205-217]

or a network of cracks. They show an aggregate polarization, with an average index of refraction of 1.578-1.615 and a biaxial negative interference figure, with 2 V about 10°. The specific gravity varies from 2.49 to 2.67. The X-ray analysis revealed that glauconite has a micaceous structure between the dioctahedral and trioctahedral types. They can be regarded as a disordered interstratification of nonexpanding and expanding layers. The amount of the expanding layers is about 21 percent. The chemical composition of the glauconite is Al_2O_3 4.95-5.01 percent, Fe_2O_3 19.49-23.82 percent, FeO 1.44-2.00 percent and K_2O 2.46-4.48 percent. Their crystal forms and thermal characteristics are very similar to those of micaceous clay minerals.

Glauconite is widely distributed in the sediments of the East China Sea, but its content is generally very low. Only in one sample did the glauconite content amount to five percent of the total sediment. In most cases only a few grains were found.

Glauconite is distributed chiefly in the middle part of the East China Sea, while only a small amount of glauconite can be found in its eastern and western parts. The middle part of the investigated area may be divided into two regions with latitude 30°N as the dividing line. The content of glauconite in the southern region is greater than that in the northern region. It is worthwhile

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to note that glauconite as an organism filling is mainly found in the southern portion of this area.

There is an inverse correlation between the distribution of glauconite and that of authigenic pyrite.

Our research shows that the well-sorted coarse sediments (0.1-0.25 mm and 0.25-0.5 mm) with a bottom temperature of 17-18°C, a salinity of 34.1-34.4 percent, a pH of 8-9 and a depth of 100-160 m are favorable to the formation of glauconite in the region of relict sediments where modern sedimentation appears to be very slow.

The parent materials of glauconite as organism filling are micaceous clay fraction with a small amount of mineral fragments such as quartz and mica. The shells are often filled with these materials. The organic decay within shells probably created a micro-environment favorable to glauconite formation. The parent materials of glauconite pellets are biotites.

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ORG: None

TITLE: Petrography of Ordovician Carbonate Rocks and the Characteristics of Sedimentary Facies in the Central Part of the North China Platform"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 218-230

TEXT OF ENGLISH ABSTRACT: Based upon the petrographic studies of Ordovician carbonate rocks in the Quyang region, Hebei Province, the sedimentary properties of the widespread tidal flat with evaporatic carbonate in the north China platform are discussed in this paper.

The Ordovician series found in the Quyang region is entirely made up of carbonate rocks and can be divided into 10 main types of carbonate lithofacies. In supratidal zones there are brecciated dolomite, gypsum-bearing dolomite, laminated dolomite and stromatolitic dolomite. Mudcracks, desiccation cracks, birdseye and gypsum are widely developed in these dolomites. The brecciated dolomite is composed of fragments of mudcrack; in the intertidal zones there are micrite, wormkalk, pelmicrite, biomicrite and the incomplete mudcracks

[Continuation of DIZHI KEXUE No 3, Jul 80 pp 218-230]

(usually deformed by weathering), desiccation cracks, solution mottles and burrows as well. It is found that the formation of "mottles" was a result of selective replacement of sedimentary-diagenetic fabrics by dolomite.

In subtidal low-energy zones there are pelmicrite, biomicrite and bio-intraclast micrite. Here the biodetritus are abundant, while the dolomitezation is rather weak. Finally, in subtidal high-energy zones there are biosparite and biointrasparite, which occur in the form of isolated and irregular small beaches under favorable conditions. The contents of trace elements are different for different lithofacies, for instance the content of Sr reaches its maximum in the subtidal zone whereas the contents of Ti, Zr, Ni and Ba are highest in the supertidal zone.

The Ordovician carbonate rocks of the Quyang region distinctly exhibit cyclic and rhythmic features in a vertical section. As far as we know, there are two categories of rhythm with five typical rhythms that differ from each other in both distribution and constitution.

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TITLE: "On the Superstructure of Plagioclases--A Discussion on Parameters and Vectors of E Diffraction"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 231-241

TEXT OF ENGLISH ABSTRACT: Based upon Megaw's model of superstructure of plagioclase (a_0, $9b_0$, $2c_0$), we studied some e diffractions of this mineral and proposed for e-plagioclases ($An_{33.3}$ to An_{72}) a correction formula of e diffraction $\delta a + \delta c = 160^\circ + N^\circ$, where N is the number of increased anorthite-like subcells more calcic than An_{50}. Therefore, $\delta a + \delta c$ will be increased by one degree for each increased anorthite-like subcell after An_{50}.

If the proposed formula holds true, we may establish the following group of equations:

$$\delta a + \delta b = 40^\circ$$
$$\delta a + \delta c = 160^\circ + N^\circ$$

$$[d_{\text{theor.}}]_b = \frac{1^*}{2|\Delta s|} = \frac{1}{2\sqrt{(ha^*)^2 + (lc^*)^2 + \ldots}}$$

where a^*, b^*, c^*, α^*, β^*, γ^* are reciprocal parameters of An_{80} with typical $I\bar{1}$ lattice.

The calculated values of ($\delta a + \delta c$) of 20 e-plagioclases are shown. The calculated values coincide well with the observed ones, and the error of the mean square root is only ± 2°. Therefore, it is necessary to rewrite $\delta a + \delta c = 160^\circ$ as $\delta a + \delta c = 160^\circ + N^\circ$. An obvious deviation of e-diffraction parameters, however, is noted for the plagioclases more sodic than $An_{33.3}$ or more calcic than An_{72}, which is caused by the predominance of $C\bar{1}$ or $P\bar{1}$ units over $I\bar{1}$ units in their lattices.

According to Megaw's superstructure model, we get An% = N/18.100, where N is the number of anorthite-like subcells in the supercells. Therefore the formula of width of the anorthite-like subcell domain in the direction of the b axis is given as follows:

$$[d_{\text{theor.}}]_b = \frac{b}{2} \cdot n$$

where n is the number of anorthite-like subcells in the direction of the b axis and b is the length of the cell edge in the direction of the b axis of An_{80} with typical $J\bar{1}$ lattice = 12.87Å. Hence, we obtain

$$[d_{\text{theor.}}]_b = 6.44 \cdot \frac{An\%\ 9}{100} .$$

It can be seen from the table that all the calculated values of $[d_{\text{theor.}}]_b$ coincide fairly well with the observed ones. Therefore, it is appropriate to take Smith's T (periodicity of supercells) as the width of an anorthite-like domain in the supercells on b axis. Moreover, the calculated values also agree well with the observed ones in the diagrams of T(d) versus An%, with the exception of An <33.3 or An >72. We hold that the e-diffraction of plagioclase is related to the anorthite-like domains.

As is well known,

$$\begin{aligned} s &= (h + \delta h)a^* \pm (k \pm \delta k)b^* \pm (l \pm \delta l)c^* \\ &= (ha^* + kb^* + lc^*) + (\pm \delta ha^* \pm \delta kb^* \pm \delta lc^*). \end{aligned}$$

Hence, $s + s_0 + \Delta s$. When $\Delta s = 0$ (or δh, δk and δl equal to zero), the above equation corresponds to the condition of normal Bragg's diffraction; when $s \neq 0$, it corresponds to the non-Bragg's diffraction.

Because we always get $\delta a + \delta b = 40^\circ$ and $\delta a + \delta c = 160^\circ + N^\circ$, as a result we have

$$\delta h + \delta k = \frac{\delta a}{360^\circ} + \frac{\delta b}{360^\circ} = \frac{\delta a + \delta b}{360^\circ} = \frac{40^\circ}{360^\circ} = \frac{1}{9};\ 2\delta h - \delta l = \frac{2\delta a}{360^\circ} \cdot \frac{-180^\circ - \delta c}{180^\circ}$$

[Continuation of DIZHI KEXUE No 3, Jul 80 pp 231-241]

$$= \frac{-180^\circ + (a + c)}{180^\circ} = \frac{-180^\circ + 160^\circ + N^\circ}{180^\circ} = -\frac{1}{9} + \frac{N^\circ}{180^\circ} .$$

Consequently, the periodicity of all e-plagioclases is 9, whereas only in the case of $N = 0(An_{44.4} - An_{50})$ will that of $2\delta h - \delta l$ be 9, because the latter changes with the composition of plagioclases.

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TITLE: "Characteristic Patterns of Zircons in the Precambrian Metamorphic Rocks from the Wuyang District, Henan Province, and Their Applications in Reconstructing the Original Rocks"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 242-248

TEXT OF ENGLISH ABSTRACT: Zircons collected in Precambrian metamorphic rocks from Wuyang district, Henan Province, were studied and their characteristic patterns are used to reconstruct the original rocks of metamorphic rocks under investigation. Thus the results obtained are satisfactory, especially in such fields as the differentiation between the amphibolites and plagioclase amphibolites metamorphosed from igneous rocks and those from sedimentary rocks. Based upon the characteristic patterns of zircons, a lithological classification of the original rocks is suggested for the Precambrian metamorphic rocks.

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TITLE: "Optical Studies of the Feldspars from Gandes Granitic Rocks"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 249-255

TEXT OF ENGLISH ABSTRACT: Granitic rocks of different ages are extensively distributed along the Gandes Chain. They are intimately genetically related both in origin and space. The rocks consist mainly of diorites, granodiorites and granites, with the predominance of granodiorites in this granite belt. In general, their distribution has a tendency to change the rocks' nature from basic to acidic from south toward north. The optical properties of feldspars indicate that alkali feldspar ordering shows itself a systematical increase along this direction just as the changes of host rocks in the composition of SiO_2, K_2O and the volatiles. The variation of the An component of plagioclase is also in compliance with the decreasing of CaO, FeO + Fe_2O_3 and MgO of the host rocks. The ordering of alkali feldspars generally can be regarded as a complex function of the chemical composition of host rocks, the dimension of rock masses and the amount and component of volatiles. Among them, it is

[Continuation of DIZHI KEXUE No 3, Jul 80 pp 249-255]

believed, the last one is most important, especially for boron. Obviously the types of rocks could play an important role in the An content of plagioclases.

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TITLE: "The Middle Triassic Reef in Guizhou Province"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 256-264

TEXT OF ENGLISH ABSTRACT: This paper deals with two kinds of reefs: barrier reef and atoll. Our research indicates that most of the organisms are Solenoporacae belonging to red algae and that the growth base is composed of algal fragments and algal nodules, which are in the form of thick growth and layer upon layer superimposing on the older algal beds.

The barrier reef found in linear distribution in the studied region runs in hundreds of kilometers to form a chain of reefs steeply dipping seaward. Therefore, the narrow jogsaw-like edge of fore-reef facies together with the slip slope and talus give a distinct picture of zigzag reef margin, which gradually developed as an algal flat with an extensively distributed blue-algal sheet

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toward the back-reef. The thickness of the flat is usually doubled as compared with that if its flank. Moreover, the Anisian and Ladinian reefs occurred more-or-less along an identical line and exhibited a clear inherency that is probably related to the ancient basement faults.

Due to its close relation with the ancient structures, the atoll is chiefly situated at the intersection of the N-S and E-W tectonic belts. The reef bodies are formed on the base of a rising carbonate buildup associated with the Upper Permian reef of Wujiaping formation.

The authors divided the reef into the following seven facies zones: (1) semi-abyssal basin, (2) basin margin, (3) carbonate platform (high energy zone), (4) carbonate platform edge (reef ridge), (5) algal flat, (6) restricted marine carbonate platform and (7) eidal flat of carbonate platform.

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TITLE: "Triassic Paleobiogeography and the Continental Drift"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 265-278

TEXT OF ENGLISH ABSTRACT: This article demonstrates from the viewpoint of paleobiogeography the nonexistence of the Atlantic Ocean, the union of the southern continents into the Gondwanaland, and hence the presence of the Pangaea in Triassic. After giving a short critique on the traditional treatment of the Triassic Tethys in paleogeographic maps, this article discusses the differences of benthonic organisms between the southern and northern margins of the Tethys, the distribution of abyssal faunas and the direct contacts of utterly different biological-petrographic facies due to subduction of the oceanic crust, all of which stand for the existence of a vast Tethys ocean during Triassic as suggested by the theory of the continental drift. A special section is devoted to the Triassic grand triangle occupying parts of Sichuan, Gansu, Qinghai and Xizang (Tibet) of China. Summing up all available data of biostratigraphy, paleobiogeography and various aspects of Triassic drifting, the author concludes

[Continuation of DIZHI KEXUE No 3, Jul 80 pp 265-278]

that the triangle was a northern part of the Triassic Tethys, while the Xizang-Western Yunnan microcontinent was a Noah's Ark drifting northeastward and collided and combined with the Eurasian plate in Late Triassic, thus bringing an end to the oceanic development of the triangle.

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TITLE: "Grain-Size Distribution and Surface Texture of Quartz Grains in Sedimentary Rocks and Their Relation to Sedimentary Environment"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 279-286

TEXT OF ENGLISH ABSTRACT: The grain-size analysis of modern and ancient sediments and the treatment of data by Folk's formula give the following parameters: the standard deviation (σ_1), mean size (M_z), kurtosis (Kg), skewness (SK_1), simple skewness measure (α_s) and simple sorting measure (S_{os}). Using these grain parameters we constructed the log-probability curves and scattered diagrams of both $SK_1-\sigma_1$ and α_s-S_{os}. According to the calculation after Sahu's discriminant and the synthetic analysis of the data, four types of sedimentary environments were established as follows: (1) deltaic distributary mouth bars arenaceous sediment (sample nos 1, 5 and 8), (2) fluvial sediment (sample no 6), (3) delta front arenaceous sediment (sample no 10) and (4) beach arenaceous sediment (sample nos 2 and 3).

In addition, the surface features of quartz grains in the samples were studied

[Continuation of DIZHI KEXUE No 3, Jul 80 pp 279-286]

under a scanning electron microscope. The resulting environmental interpretation coincides fairly well with that derived from grain-size analysis, suggesting that the combination of the two approaches mentioned above is an important and effective way to analyze the sedimentary environments, especially the reconstruction of the ancient sedimentary environment.

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TITLE: "Study of a Mixed-Layer Clay Mineral from the Liaohe Basin of Northeast China and Its Sedimentary Environment"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 287-291

TEXT OF ENGLISH ABSTRACT: X-ray diffraction analysis shows that three fresh clay samples collected from cores of Oligocene Sha-3 members in a region of northeast China are irregular mixed-layer illite-montmorillonite minerals. The respective proportions of both layers were also estimated from the diffraction diagrams. It is suggested that the presence of mixed-layer minerals reflects to a certain extent the changes in the sedimentary environment and physicochemical conditions during their formation.

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TITLE: "Study of the Jianshi and Leshan Siderites"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 292-295

TEXT OF ENGLISH ABSTRACT: Siderite specimens collected from Jianshi County, Hubei Province, and Leshan County, Sichuan Province, have been studied by X-ray diffraction analysis, wet chemical analysis, electron probe analysis and microscopic examination, and the following minerals were recognized: kamacite, taenite, plessite and a few silicate minerals. In addition, Jianshi siderite also contains troilite, cohenite, magnetite and limonite.

According to the Widmanstatten structure, the width of the kamasite band (0.5-0.76 mm for Jianshi siderite, 0.1-0.5 mm for Leshan siderite) and content of nickel (Jianshi siderite--7.8 percent, Leshan siderite--8.64 percent), the Jianshi specimen is considered to be a medium-grained octahedron siderite and the Leshan specimen a fine-grained octahedron siderite.

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TITLE: "Weiyuan Mesosiderite"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 3, Jul 80 pp 296-298

TEXT OF ENGLISH ABSTRACT: The meteorite described in this paper was found in Beizhai Commune, Weiyuan County, Gansu Province, China. It is located at λ 104° 19'27"E, Ψ35°16'28"N. The Weiyuan meteorite is composed mainly of orthopyroxene, anorthite, kamatite, taenite, rutile, olivine, troilite and chromite, etc. According to its mineralogical and chemical compositions and structural features, it should belong to the type M mesosiderite. This is the first discovery of this kind of meteorite in China.

9717
CSO: 4009

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TITLE: "Statistical Testing Research on the Methods of Parameter Estimation in Hydrological Computation"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 3, 17 Jun 80 pp 1-15

TEXT OF ENGLISH ABSTRACT: Based on the method of statistical testing, this paper analyzes and compares the methods of moments, maximum likelihood and curve-fitting in the case of Pearson type III distribution. For the curve-

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fitting method, a comprehensive comparative analysis is made on seven criteria of curve fitting and mainly on two of them--the least squares criterion φ_1 and the least absolute-values criterion φ_2, as well as on the various plotting position formulas. Moreover, the role of historical flood is also examined. The results of calculation indicate that the quantity X_p derived from the moment method has a much smaller expected value EX_p than does the true value x_p^0 of the population, and that this is on the unsafe side. The maximum likelihood method yields somewhat better results but it cannot be accepted as a universal method because it yields no solution to the Pearson III curve when $C_s \geq 2$. For the curve-fitting method, it is found that the result is substantially affected by the criterion used for curve fitting. In general, φ_2 criterion associated with the Weibull formula (abbr. in φ_2-W) may give slightly greater EX_p than x_{po} and smaller root-mean-square error σX_p. Consequently, φ_2-W curve-fitting method proves to be the better one among all the methods available. The use of historical flood would usually increase EX_p and decrease σX_p and is, therefore, an important means of improving the computational results.

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TITLE: "Effects of Closing Off an Estuary on the Tides in an Adjoining Bay"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 3, 17 Jun 80 pp 16-26

TEXT OF ENGLISH ABSTRACT: This article describes a mathematical model for the tides in a bay. The objective is to anticipate with this model the effects that closing off of an estuary may have on the tides in an adjoining bay. As the area investigated is 105 km long and 25 to 65 km wide, a depth-integrated, two-dimensional model is employed. Schemes for finite-difference computations have been derived by applying the theory of characteristics to the full equations of motion with the convective acceleration terms retained. Altogether 12 types each of land and water boundary conditions have been considered.

In the first place, tides in the bay under natural conditions are modeled. By

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adjusting the resistance coefficient and by proper schematization of the topography of the bay, satisfactory reproduction of the tides can be achieved. Although the maximum deviation of the computed tidal stage from the observed is 0.26 m at high tide at a station where the tidal range is 6.20 m, the phases of computed and observed tides are practically identical at all tidal stations. There is a station where depth-integrated current data for a complete tide have been recorded. It is somewhat surprising that the current data are closely modeled in magnitude, phase and direction.

Based on the successful modeling of the natural tides, the closure of the estuary is next simulated and the corresponding tides in the bay computed. It is found that high water at the closure dam will come sooner than under natural conditions and that the high tide is lowered and the low tide elevated so that the tidal range at the closure dam is reduced somewhat.

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TITLE: "Mathematical Model of Unsteady Seepage Flow in Embankment Dams"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 3, 17 Jun 80 pp 27-36

TEXT OF ENGLISH ABSTRACT: In this paper, we mention the usual mathematical models of unsteady seepage flow in embankment dams from a physical concept for those to date in our country and foreign countries. However, according to the physical meaning of drainage porosity μ, that which usually results from adopting a final steady value would not satisfy the physical course of unsteady seepage flow. Thus we propose different values of μ in corresponding time intervals suitably chosen.

Using many computations by the finite element method for each mathematical model and by analyzing the position of free surface, distribution of flow field and stability of upstream slope, the physical configuration of unsteady seepage flow in embankment dams is satisfied by the equation given. This, in association with the boundary condition of seepage discharge of free surfaces, is compared with the experimental data of the sand model and is thus verified.

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TITLE: "Determination of the Deformation Characteristics of Rock Masses by Radial Jacking Tests"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 3, 17 Jun 80 pp 37-51

TEXT OF ENGLISH ABSTRACT: This paper describes the testing results of determining the deformation characteristics of rock masses by radial jacking tests conducted in two hydroelectric projects, Yingxiuwan and Yilihe III. The influence of the loading length on the extent and depth of deformation was investigated. It indicates that the measured rock deformation should be modified with the given formula when the loading length is less than three times the diameter of the test tunnel. In addition, the validity of the principle of superposition

[Continuation of SHUILI XUEBAO No 3, 17 Jun 80 pp 37-51]

is studied in connection with the feasibility of using the elastic theory in rock mechanics.

In the present paper a comparison between the results obtained from whole-sectional loading tests and partial loading tests (the latter is equivalent to the plate bearing test in an exploratory adit) indicates that in the latter cases the effect of the periphery of the test tunnel whould be considered and calculated according to the formula.

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TITLE: "Static Calculation of Water Load Acting on Tunnels"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 3, 17 Jun 80 pp 52-62

TEXT OF ENGLISH ABSTRACT: For a hydraulic tunnel, water load is the main concern. In the static calculation of such a tunnel, it is a common practice to treat the water load as a boundary force without consideration of the time factor of groundwater. This will result in considerable error in some cases. This paper proposes a method to take the water load as a field force and to make static calculations of the adjoining rock mass and lining of the tunnel by considering the time dependence of water load on excavating and lining of the tunnel. Due to geological tectonic action, the rock mass is a medium invariably containing fissures. The calculation, by way of seepage field, allows this feature to be considered, and a corresponding mathematical model is used accordingly. In the static calculation, the rock mass is assumed to be an isotropic elastic medium, and consideration is made of the effect of joints and

[Continuation of SHUILI XUEBAO No 3, 17 Jun 80 pp 52-62]

fissures, as well as of the dependence of the water load on the relative periods of tunnel excavating, supporting and lining. A special computer program, SJDI, is prepared on the basis of the above principle. This program also has the function of calculating stress and displacement fields at various periods of tunnel excavating and supporting under the actions of a seepage field and initial stress field.

9717
CSO: 4009

Metallurgy

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TITLE: "Dynamics of Bath Movement in Oxygen Bottom-Blown Converter"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 1-9

TEXT OF ENGLISH ABSTRACT: This paper attempts to discuss the dynamics of bath movement in the oxygen bottom-blown converter. A parameter is suggested for selecting the oxygen pressure, called the nozzle delivery pressure ratio $\varepsilon'_a \leq 0.25$. An equation is derived for the quiet-blowing condition, which shows the relation to be obeyed, in order to prevent the injected oxygen flow changing from "gas-bubbling" to "gas-streaming." Another equation is given for good bath circulation, expressing the value of F'_r to be kept. The formula derived for determining the converter volume defines the relation to be kept among bath diameter, oxygen flow, nozzle number, charge weight and converter volume, so as to prevent splashing.

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TITLE: "Characteristics of Coarse Nonmetallic Inclusions in Rimmed Steel"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 10-17

TEXT OF ENGLISH ABSTRACT: The present paper shows that lamination defects in rimmed steel sheets are caused mainly by coarse non-metallic inclusions in the 0.5 to 5 mm range. Using samples of galvanized sheets ≤ 0.5 mm thick, the quantity, size, distribution, composition and structure of the coarse impurities have been investigated. They are found to be entirely different in nature from smaller inclusions. Experiments have also shown that an open type rimmed steel ingot of 7.1 tons would contain 100 to 1000, and a closed type ingot 5 to 30 inclusions of this kind, enough to cause rejection of a large proportion of the sheet product. The coarse inclusions are mainly distributed in the lower part of an open type ingot and the upper part of a closed type ingot. They reveal an annular distribution on the horizontal cross section of the ingot. These coarse inclusions exist in all rimmed steels, but are not easily detected in medium and thick plates and shapes.

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TITLE: "A Study on High Speed Steel Melting Using V_2O_5 as Alloying Addition"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 18-24

TEXT OF ENGLISH ABSTRACT: The thermodynamics and kinetics of V_2O_5 reduction in an electric furnace melting high speed steel are described. Results of experiments proved that V_2O_5 could be used as an alloying addition in the place of Fe-V, and this is of economic significance.

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TITLE: "Theoretical Analysis and Realization of the 'Complete Asynchronous' Rolling"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 25-30

TEXT OF ENGLISH ABSTRACT: This paper gives a theoretical analysis of "complete asynchronous" rolling from mechanical and kinematical considerations. Analytical and computational expressions for unit-pressure distribution, average unit pressure, total pressure have been derived, as well as the tension and thickness, and technological principles are described for realizing "complete asynchronous" rolling which, it is expected, could be used in setting, controlling and studying this rolling process.

From the theoretical analysis, it can be seen that "complete asynchronous" rolling is realizable, but its condition is rather strict, and that the "S" asynchronous rolling is one of the better processes. It is shown that the tension of this process possesses the ability of self regulation. The application of "S" asynchronous rolling to production is discussed.

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TITLE: "Calculation of Stresses in the Quarto-Prism Mandrels for Strip Coilers"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 31-37

TEXT OF ENGLISH ABSTRACT: Most of the formulas for the calculation of radial stress in mandrels for coilers are derived from the Lame equation, based on the assumption that the mandrel and coil are cylinders of thick walls, and that in both the elastic deformations are the same. Due to the development of strip mills, the improvement of quartoprism mandrels, and the application of automatic collapse control, these formulas have become unsuitable.

Based on the real working conditions of the mandrels (the quarto-prism mandrel not being cylindrical and the use of automatic collapse control), a formula is derived from the dependence of radial mandrel stress on the limiting pressure in the hydraulic circuit of the collapsible cylinder of the mandrel.

The formula has been compared with some experimental curves and existing

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mandrels. Production practice of mandrels designed and manufactured according to the new formula has proved that the calculations are in good agreement with practice and that the formula is suitable for use in design calculations.

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TITLE: "Influence of Martensite on Steels' Properties in 15CrMo and 12Cr1MoV"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 38-47

TEXT OF ENGLISH ABSTRACT: "Yellow blocky martensite" has been found in some of the 15CrMo and 12Cr1MoV steel pipes delivered to a boiler factory for use in the manufacture of high pressure boilers. This martensite appears to be yellow under the microscope (without filters) with a high hardness, and is considered to be a martensite rich in carbon. Its formation was found to be due to improper heat treatment. The normalizing temperature had been too low (below Ac_3) and there was no tempering or the tempering temperature had been to high (above Ac_1). In either case, the steel structure was ferrite plus austenite rich in carbon. During consequent cooling the carbon-rich austenite transformed into martensite. Tests at room temperature and high temperature proved that this martensite caused an increase in room temperature strength and a

[Continuation of GANGTIE No 3, May 80 pp 38-47]

catastrophic decrease in high temperature rupture stress. Metallographic observation showed that a comparatively rapid transformation occurred in specimens that contained martensite, i.e., the structure decomposed into ferrite plus dispersed carbides after testing for several thousand hours, while in specimens with conventional structures, a considerable amount of tempered bainite remained after 10,000 hours of testing. The heat treatment of finished pipes must be controlled strictly in order to prevent martensite formation. A lower tempering temperature is suggested. The proper way to eliminate such martensite in received pipes is to perform normalizing followed by another tempering.

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TITLE: "New Developments in the Magnetic Concentration of Iron Ores"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 3, May 80 pp 75-78

TEXT OF ENGLISH ABSTRACT: In this paper, the general situation of world iron ore production in the last 25 years (1950-1974) and the total reserves of iron ore are presented. In order to increase the productivity of blast furnaces, they must be fed with high iron content burdens. Since the greater part of the iron ore reserves in our country is low grade ore, this can only be fulfilled by concentrating these ores. This paper describes the new developments in iron ore concentration by magnetic separation. Different types of magnetic separators with low and high field intensity are described in detail.

9717
CSO: 4009

AUTHOR: None

ORG: Third Geological Team, Shandong Provincial Bureau of Geology

TITLE: "Understandings in the Extension of Small Caliber Diamond Drills"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 7-10

ABSTRACT: The team began to operate its first small caliber diamond drill in Dec 75. Through gradual development, the team now has 7 such drills. In these 3 years, 105 holes of varying sizes have been completed, and 94 percent of these meet the geological requirements. The unit cost of the drills was 24.7 yuan in 1977 and 32.85 yuan in 1978. The average footage for natural diamond drill has been 36.31 m, 40.46 m for artificial diamond drills; that of 49 bits exceeded 100m, and the maximum for a bit was as high as 311m. The paper discusses the team's experience of gradually adopting small caliber diamond drills to replace steel granule bits for rock boring. Problems of burnt drills, sudden reduction of average footage per bit, excessive drill pressure, etc. occurred during this period of 3 years are analyzed.

AUTHOR: None

ORG: Hubei Provincial First Geological Brigade

TITLE: "A Footage of 502m Achieved for No 2990 Natural Surface Inlay Diamond Drill Bit"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 11-12

ABSTRACT: The brigade began to use diamond bits for its No 9 drill in 1976. A record single bit footage of 403.97 was created in 1977 with Wuxi natural internal inlay No 7005 drill bit; 442.63 m in 1978 with Zhengzhou natural surface inlay No 2588; 502.73m in 1979 with Zhengzhou natural surface inlay No 2990 drill bit. Members of the brigade have been seriously learning the diamond drilling technique. During the practice period since 1976, experience has been continuously summarized to improve the work procedure, to reduce the cost of drilling prospecting, and to utilize the full advantage of the small caliber diamond drill bit. The experience of achieving the record 502m footage is analyzed, specification of the drill bit No 2990, parameters of the drilling process, and conditions of the prospecting site are reported. The condition of wear of drill bits is also described.

AUTHOR: None

ORG: Prospecting Engineering Division, Shaanxi Provincial Bureau of Geology

TITLE: "Abnormal Wear of Diamond Drill Bit in Rock Core Drilling Prospecting"

SOURCE: Beijing TANKUANG GONGCHENG [PROSCPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 12-15

ABSTRACT: In the past several years, the bureau has been gradually extending the diamond drilling technique and relatively good results have been obtained, but due to reasons of poor coordination among equipment, work procedure, and technical skill, the effort in lengthening the life of the drill bit has been directly affected. A most recent analysis of a batch of used bits disclosed that the ratio of abnormal wear reached as high as 69.4 percent. This fact and the fact of the unreasonable price of these drill bits have combined into an obstruction to further development of diamond drilling. Factors affecting the life of the drill bits include the quality of the diamond, the method of making the bit, suitability of the strata, and the technique of drilling and drill operation. This paper analyzes the worn bits, classifies the conditions of abnormal wear, and describes the various markings on the worn bits for the purpose of determining correctly the reason for the abrasion or damage so as to formulate proper measures for prevention. The paper includes photos of worn bits.

AUTHOR: WANG Sili [3769 1835 4409]

ORG: Geological Team, Beijing Bureau of Construction Materials

TITLE: "Advantages of Small Caliber Drill Prospecting in Cement Rocks"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 16-17, 10

ABSTRACT: Prospecting for calcareous rocks used in cement is an important job of construction materials geology. For the purpose of improving drilling efficiency, the Construction Materials 604 team (Beijing Construction Materials Bureau Geological Team) and the 402 team (Guangdong Construction Materials Geological Prospecting Team) began to try diamond small caliber drilling in 1976 and 1977. The average footage was 140m per bit for 604 team, with a 300m maximum, and about 200 m for 402 team, with a 350m maximum. The paper compares the efficiency and quality of bits of different calibers and efficiency and cost of operation of the 2 teams, as well as the cost efficiency of various types of diamond bits.

AUTHOR: WENG Jiao [5040 2699]

ORG: None

TITLE: "Investigation Into Automobile Drill Designing (Motive Power Portion)"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 18-23

ABSTRACT: In the past, many papers confused vehicle-carried drills and automobile drills. In the former, the vehicle and the drill are separate entities; the structure of the drill is not related to an automoble while the vehicle serves the function of transporting the drill only. In the latter, the motive power of the automobile is used as the motive power of the drill, and as much as possible, its gearshift, clutch, the universal joint, the air pump, etc. of the automobile are also utilized by the drill as integral parts. Since gasoline engine is used in an automobile, the design of an automobile drill also involves studies on the characteristics, the work condition, and the work limit of gasoline engines. Problems and parameters of the internal combustion engine, as it is applied as the motive force of the drill are discussed at length in the paper.

AUTHOR: LI Dayong [2621 1129 3938]

ORG: None

TITLE: "Application and Development of Reverse Cycle Drilling Technique"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 24-26, 15

ABSTRACT: Advantages of reverse cycle drilling, compared with the normal cycle, include a low power consumption, the realization of continuous sample taking without contaminating specimens, better elimination of dust, better cooling of drill bit, higher footage efficiency, etc. The paper also briefly introduces 6 different types of reverse cycle drills.

AUTHOR: XIAO Shunzi [5135 5293 0745]

ORG: Seventh Geological Brigade, Hubei Provincial Bureau of Geology

TITLE: "On Straight Line Bucket Cutting Demolition"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 27-30

ABSTRACT: Ordinary, to add new free surfaces to a tunnel, diagonal cutting is used, but a tunnel has specifications and the hole is limited by the minimum resistance line. Furthermore, the rock hacking machine cannot make a relatively deep diagonal hole. For these reasons, the footage made by each blast is also very limited. This paper introduces the using of straight line cutting to make a bucket-shaped hole for overcoming this weakness to increase work efficiency.

AUTHOR: None

ORG: Hole Protecting Leak Plugging Team, Institute of Prospecting Work Technology Research

TITLE: "Phenylic Acid Denatured Urea Aldehyde Resin Powder"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 38-41

ABSTRACT: Application of high molecular chemical grouting is a new field of high molecular applied chemistry. Advantages of using liquid phenylic acid denatured urea aldehyde resin to protect holes and plug leaks include the easy availability of raw material, which is inexpensive, easy control of solidifying time, good mechanical property, etc. But, it also has shortcomings. It can be stored only about 6 months, packing and transportation are difficult, and to establish a machine shop to make it in every geological team would create waste of manpower. For these reasons, at the 1977 meeting of the State's Bureau of Geology, the suggestion of Anhui 311 Geological Team for making the phenylic acid denatured urea aldehyde resin into powder was welcomed by all delegates, and the job of studying the way to do it was given to the institute. The institute began the research project late 1977. Finally, with the help of Chengdu Glue Plant, the powdered resin was successfully made. This paper reports the way to make it and its major properties.

AUTHOR: CHEN Houxian [7115 0683 6343]

ORG: First Geological Team, Jiangsu Provincial Bureau of Geology

TITLE: "Reasons for Excessive Machine Oil Consumption of 295, 495 Diesel Engines"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 42-43

ABSTRACT: The merits of 295, 495 diesel engines have been widely confirmed, but their shortcoming is the fact that they consume too much machine oil. One 495 diesel machine of the first geological team had used 10.5 kg/24 hours of machine oil, the equivalent of 9.7 g/horsepower hour. This is twice as much as the highest level,5 g/horsepower hour,permitted by Yangzhou Diesel Engine Plant. This paper reports the reasons for the high consumption and ways of reducing machine oil consumption of these diesel engines. The paper also includes a section listing items to be given attention when these diesel engines are being operated.

AUTHOR: QIAN Bingchang [6929 3521 2490]

ORG: 417 Team, Hunan Provincial Bureau of Geology

TITLE: "Drill Prospecting Work Slide Rule"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 44-45

ABSTRACT: After 2 years of research, the first batch of slide rules for calculating irregular specifications in the hole of any stage of drilling, the total weight of drill machine of different unit weights, including the weight of drill tool under flushing fluid of different specific gravity or the weight in a diagnol hole, lifting resistance, etc. have been completed. Many data used to make the slide rule were obtained during practice and through computation after having mastered the regularities in the process of practice. The workers and technicians have found the slide rule useful and convenient and the data relatively accurate. There remain many shortcomings, however. The slide rule is too big, the characters too small, and there are mistakes in the data and in the graduation. Future improvement is planned.

AUTHOR: WANG Yuechen [3769 2588 5256]

ORG: Sixth Geological Team, Yunnan Provincial Bureau of Geology

TITLE: "Analysis of Troubles of TLGI-1 Silicon Controlled Exciter Regulator"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 46-47

ABSTRACT: In recent years, silicon controlled exciter regulator is being extensively used in intermediate and small A.C. synchronous generators. It improves the quality of the power suppl and is generally welcomed. In the process of utilization, the regulator is found to be not long lasting and easily damaged, however. This shortcoming may be overcome by correct utilization and reasonable repair and maintenance. Using the TLGI-1 silicon controlled exciter regulator produced by Shanghai Switch Plant as an example, this paper introduces the common troubles and ways of analyzing the troubles in order to repair the system. Circuit theory and the work principle of this regulator are given.

AUTHOR: None

ORG: Department of Prospecting, North China Metallurgy Geological Prospecting Company

TITLE: "Stratified Drilling Experiment With Artificial Diamond and Hard Alloy Bits"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 48-49

ABSTRACT: At the production experiment site of a certain iron mining region, the strata vary a great deal between soft and hard, and diorite, metamorphic diorite, and large rock bodies appear alternately. In the relatively compact diorite, the artificial internal inlay diamond drill makes good footage and the efficiency is twice as high as that of steel granule bit, 1.5 times better than needle-shaped alloy bit, and 5.8 times better than common hard alloy bit. In the metamorphic diorite, the artificial diamond bit is still better than other bits. In the relatively soft marble, the efficiency of the diamond bit drops obviously. The footage, the average m/hour, etc. of the various bits of various calibers in different rock strata, the condition of bit damage, and other data of the experiment are reported.

AUTHOR: None

ORG: Department of Technical Safety, Gan Dongbei [Northeastern Jiangxi] Geological Brigade, Jiangxi Provincial Bureau of Geology

TITLE: "Moveable Work Platform Automatic Safety Device"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 50-51, 23

ABSTRACT: The moveable work platform is an improvement over the drill tower platform. The moveable platform has the merits of saving wood, reducing the need for transportation, lightening the work load, and convient to work on. The hanging type moveable work platform is operated with hand brakes, however. The workers are often too busy to remember to brake it sufficiently to cause the platform to rise or fall suddenly to result in serious accidents. Tragic accidents taught the Department that the moveable platform [scaffolding?] should have a safety device. One was designed in March 79. The device includes 2 parts; one for preventing it to fall and the other for preventing it to slide. The work principle of the safety device, the condition of the test use, the method of installing it onto the moveable scaffolding are reported. The method of installing the device onto the scaffolding is illustrated with a drawing.

AUTHOR: None

ORG: Seventh Geological Brigade, Liaoning Provincial Bureau of Geology

TITLE: "Method of Improving the Quality of Making Drill Rods"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 pp 52, 49

ABSTRACT: Before 1977, the brigade had a very serious problem of broken drill rods. Accidents due to broken drill rods in the hole amounted to 17.6 percent of the drilling time in 1977. Measures to improve the process of making the drill rods were adopted. In 1978, the accident time due to broken drill rods in the hole was reduced to 7 percent of the drilling time for that year, it was further reduced to 1.7 percent in 1979. Ways adopted to improve the way of making the drill rods is described.

AUTHOR: GUO Qingxin [6751 1987 2450]

ORG: Repair and Assembly Shop, Geology 9th Team, Honan Provincial Bureau of Geology

TITLE: "Improvement of the Pressure Device of DPP-100 Automobile Drill Drill Rod"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 p 53

ABSTRACT: The pressure device of the DPP-100 automobile drill drill rod was originally designed to add pressure with a hand crank for the purpose of improving the footage efficiency and lightening the work load. The author and colleagues added a worm shaft to make the hand crank much easier to operate. The added structure is depicted in a drawing.

AUTHOR: BEN Kun [6321 0981]

ORG: Third Geological Team, Hubei Provincial Bureau of Geology

TITLE: "Slight and Convenient Rock Core Specimen Splitting Machine"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 1, Feb 80 p 53

ABSTRACT: For the purpose of lightening the work load, the team designed a rock core specimen splitting machine, weighing only 17 kg. The original machine weighs 60 to 70 kg. The structure is identical to the original one, however. The new machine has been tried for 10 years. Aside from the splitting knife and the punch head, none of the other parts have ever been damaged. Now every branch team has been given a machine of the new design.

AUTHOR: MAO Wenzhang [3029 2429 4545]

ORG: None

TITLE: "Quickly Realizing Scientific Management of Geological Prospecting"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 1-3

ABSTRACT: Geological rock core drilling engineering is an important aspect of the work of searching for minerals and at present, it is the only reliable way of obtaining first hand material information. Geological observation and evaluation of mineral reserves form one of the important means of supporting geological reports. This work consumes a gigantic quantity of manpower, materials, and capital investment. The geological system operates about 2,500 drills of all types to complete 5,000,000m^3 of drilling work every year. In the past decade, the interference and destruction of the gang of four and the blind continuance of old management techniques of the USSR of the 1950's have resulted in no reform of the system of management and methods of economic and technical accounting to cause the quality of engineering to be poor, footage efficiency to be low, material consumption to be great, and accident rate to be high. In the paper, the author proposes a 7-point reform to overcome this situation. He invites the drilling workers and management leaders of all ranks to discuss his proposal.

AUTHOR: ZOU Zhihua [6760 4249 5478]

ORG: None

TITLE: "Results of Drill Sampling and Several Problems of Future Development"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 4-7

ABSTRACT: Drill sampling is the use of ultra-miniature core drilling machine to take specimens. This type of drill is small, light, and easily moved. It can be used to penetrate the ground surface cover to take samples from the shallow stratum or soil layer. This technique is currently adopted by many advanced countries of the world for general prospecting. Before the 1970's, China had followed the related principle of the USSR for using well, fellow, or shallow pit prospecting and mostly through manual digging. The work was labor intensive and very slow. It was in the late 60's that research on that type of drills began; several types, including the 502, the XB-25, the QZ-5, and the Zhengguang 10-1 have been made, but only Zhengguang 10-1 is in steady production. The technique is mainly to use drilling to replace partially the fellow-digging work. This paper reviews the results of sample drilling since 1973 and problems relating to the quantity and quality of the technique. Many current shortcomings are discussed and positive development of new methods, new equipment, and new work procedure is urged.

AUTHOR: WANG Kaiwen [3769 7030 2429]

ORG: Scientific Research Institute, Neimeng Coal Geological Prospecting Company

TITLE: "Rock Classification of Zhuozishan Region"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 8-9

ABSTRACT: In China and abroad, rock classification methods may be said to belong to one or the other types. One type is classification according to drillability based upon test data. As production and technical conditions change, this type of classification may easily be outdated. This paper introduces the method of classifying rocks according to one characteristics or several major characteristics of the rocks themselves, i.e. classifying rocks according to tested dynamic hardness and pressure resistance of the rocks. Two instruments designed and made by the Institute of Prospecting Technology Research of Ministry of Geology were used to divide the 34 representative specimens collected from the No 911 Hole of Zhuozishan Region according to their hardness and pressure resistance. The data are reported.

AUTHOR: JIANG Tianshou [3068 1131 1108]

ORG: Institute of Prospecting Technology Research, Ministry of Geology

TITLE: "Problem of Upside Down Inversion of Rock Core During Jet Type Reverse Cycle Drilling"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 9-13

ABSTRACT: Jet type reverse cycle drilling at the bottom of the hole is an effective method of improving the rate of gathering specimens of hard, brittle, and clastic rock and mineral strata. Inversion of the rock core occurs when the core is broken, or there is sufficient amount of broken core in the core pipe to produce an upside down space shift, or the reverse cycling fluid has a sufficient flow speed to cause the broken core to rise. This paper reports data of mathematical and laboratory simulations of the condition. Method to estimate and calculate the maximum amount of water back flow or maximum size in reverse cycle drilling not to cause the rise of broken core and produce an upside down inversion is proposed accordingly.

AUTHOR: YANG Xiaoxian [2799 1321 0341]

ORG: Guangxi Construction Material Industry Geological Team

TITLE: "Adoption of the Method of 4-shift 8-cycle Digging in Tunnel Mineral Prospecting to Accelerate the Footage"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 14-15

ABSTRACT: Based upon past experience, tunnel prospecting is necessary. In the past, 4m of drill prospecting and 1m of tunnel prospecting formed the adopted rule. In the process of tungsten prospecting in Jiangxi Province, the rule of 4m drilling and 2m tunneling was used. In countries such as the USSR, Japan, and Australia, the tunneling work generally amounts to 45-50 percent of the drill prospecting work. Results of tunnel prospecting are the best, but the work must be mechanized and the manpower must be organized reasonably. This paper compares the footage of 3-shift and 6-cycle organization of labor with the 4-shift 8-cycle way of organization. If the footage of each blast is 1.2m, the former will complete 7.2m per day and 187m per month, while with the latter a footage of 250m may be completed in a month. Charts are given to describe the work progress of the 4-shift 8-cycle method of organization suggested by the paper.

AUTHOR: ZHANG Hongye [1728 3163 0673]

ORG: Bureau of Hydrological Geology and Engineering Geology, Ministry of Geology

TITLE: "An Investigation of the Direction of Development of Hydrological, Well Drilling Prospecting Technology"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 16-18

ABSTRACT: In the past 30 years, a great deal of technical reform and reconstruction have occurred in China to improve the prospecting efficiency and engineering quality of hydrological, well drilling technology to contribute to the prospecting and development of ground water resources. In 1979, the geological system had 73 hydrological teams to operate about 560 drill machines and complete about $900,000m^3$ of prospecting work. At present, there is still a great distance in well drilling technology and technical equipment in China, compared with those of the advanced in the world, however. This paper reviews the current problems and needed improvements in the field.

AUTHOR: ZUO Keqian [1563 0344 6197]
HUANG Zipei [7806 5261 1014]
SHAO Junqi [6730 0193 3825]

ORG: All of Tianjin Municipal Geological Division

TITLE: "Water Filter Pipe With Pasted-on Gravel"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 19-20

ABSTRACT: The water filter pipe with pasted-on gravel is a new well filter device. Artificially synthesized resin is used to paste gravel onto the external surface of a pipe to a thickness of 10-18mm and a porosity of 23 percent. Research on this device has been preliminarily successfully completed by the division. The work procedure of using common epoxy resin, phenylic or urea aldehyde resins, or furan resin to paste gravel onto pipes made of either metal, or plastics, or glass-steel is described. Advantages of this type of filter include good quality of water, faster well drilling due to simplification of well structure, reduction of well drilling cost, and reduction of equipment wear and material consumption. Photo and drawings are included to depict the structure and appearance of this type of filter.

AUTHOR: YANG Jingbin [2799 2529 1755]

ORG: None

TITLE: "Successful Research on 3 Types of Catalysts and Their Installation Assemblies"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 p 21

ABSTRACT: A joint research project by Beijing University, Anhui Provincial 313 Geological Team, Zhejiang Jinhua Geological Brigade, Tianjin Painted Insulating Wire Plant, and Shanxi Provincial Bureau of Geology has successfully produced PLC Globular Platinum Catalyst, XLC-1001 Rare Earth Catalyst, and PFC Beehive Platinum Catalyst. All have been used on CJ-12 diesel engine vehiclesand Hongqi Internal Combustion Trucks. Catalytic converter box and smoke cleansing box have also been designed to be used with the 3 types of catalysts. After 1,000 hours of test run, the purification effects were found to be good. In the experimental tunnel, the ratio of harmful gases was found to be less than the standard set by the State. A certification conference was called by the Bureau of Science and Technology of Ministry of Geology and held in Beijing in Jan 80. The 40 plus delegates listened to the reports of the research group and observed the laboratory and the work condition of the Hongqi internal combustion truck with the catalytic converter installed. It was certified that the products meet the standard of industrial hygiene completely. Photos of these catalytic converters are included.

AUTHOR: WANG Xikai [3769 1585 0418]
WEI Ruying [7614 3067 4481]
ZHOU Xiang [0719 5046]

ORG: All of Geological Prospecting Division, Kirin Provincial Bureau of Geology

TITLE: "Merits of Diamond Drilling Considered From the Viewpoint of Economic Effects"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 41-42

ABSTRACT: Diamond drilling has the obvious merits of high efficiency, good quality, saving steel materials, and low labor intensity, but at present the diamond drill bit is rather expensive. The cost of materials per m of drilling footage is at times higher than that of steel granule bits. This fact interferes with further extension of diamond drilling prospecting. The authors went to Lianhuashan Mining District to carry out a survey to study the economic effects of diamond bits. That district contains mainly copper veins, with the average hardness of rocks from 8 to 9. Prospecting began in 1970 with steel granule drills first; in 1976, diamond drills began to be gradually adopted. The cost per m averaged 34.54 for the diamond bits and 30.12 yuan for the steel, but the cost of the diamond drilling per m had dropped from 53 yuan in 1976 to 26 yuan in July 1979. Furthermore, due to its high efficiency, if the cost of wage, worker's welfare bonus, insurance fund, repair, and transportation fees are properly added, the cost per m of the diamond bit is 5.7 percent less than that of the steel. Cost and quality data of both types of drill bits are given.

AUTHOR: None

ORG: 212 Geological Team, Shanxi Provincial Bureau of Geology

TITLE: "Effects of Using JXT-247 Gyroscope Inclinometer"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 42-45

ABSTRACT: The team works at a magnetite mining district. The drill holes are mostly 200-400m deep. Begining in Jun 1979, the JXT-247 gyroscope inclinometer produced by Beijing Geological Instrument Plant (47mm external diameter) has been adopted to determine the gradient of the hole. By the end of 1979, the instrument had been used to measure 17 holes, a total of 4,806m. The holes in the district are all diagonal holes, and the gradient is measured every 50 m of drilling footage; if the stratum is soft and the vertex angle of the design is relatively small, measurements are taken even more frequently. This test application proved the instrument to be a relatively ideal inclinometer in today's small caliber drilling work. Three proposals of improvement are also included.

AUTHOR: SHEN Guichen [3088 2710 1820]

ORG: Honan Provincial Geology Ninth Team

TITLE: "Technical Measures for Preventing Sleeve Pipe Accidents and Resolving the Difficulty of Lifting to Withdraw"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 46-48

ABSTRACT: The technique of leaving a sleeve pipe to protect the hole is well-known, but after the sleeve pipe is in place, accidents of breaking, slipping, and shifting often occur to cause the sleeve pipe to be difficult to remove. In some cases, the hole may have to be abandoned. With this worrying problem, some workers prefer not to place a sleeve pipe whenever the drill hole appears to be complex. Consequently, a large quantity of manpower and materials are consumed to treat the hole with other methods. From lessons learned in the past several years, the Xuchang Iron Ore District of Henan adopted 5 technical measures during the process of installing a sleeve pipe and several ways of lifting the pipe to remove it. These measures and ways are described. A table listing the conditions of installing and removing the sleeve pipes since these techniques were adopted in 1975 is included.

AUTHOR: CHEN Houxian [7115 0683 6343]

ORG: First Geological Team, Jiangsu Provincial Bureau of Geology

TITLE: "Breakage At the Latch Position of the External Wire of the Drill Rod and The Reform of the Structure of the Wire Latch"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 48-49

ABSTRACT: A broken drill rod can cause a great deal of problem and if the strata are complex, the danger is even greater. The rod may break in the middle while inside the drill hole or the head of the wire latch may break. The reason for the occurrence of the latter is mainly an unreasonable structure of the wire latch. This paper analyzes the defect in the original structure of the wire latch of the drill rod and introduces methods of reconstructing it. Merits of the reconstructed part are discussed. The team adopted this type of reasonable wire latch 6 years ago, and the various phenomena of breakage of the wire latch position have been eliminated. Similar satisfactory results have also been obtained after the Jiangsu Bureau of Geology extended this reform to all its teams.

AUTHOR: MA Qianyuan [7456 1987 6678]

ORG: 325 Team, Anhui Provincial Bureau of Geology

TITLE: "Method of Coring in Loose and Soft Stratum"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 p 50

ABSTRACT: The mining district where the team works has complicated strata, which may be basically divided into 3 types: relatively whole strata, loose and soft strata, and broken strata, in ratios of 20, 20, and 60 percent respectively. Problems of coring in the latter 2 types have not be resolved satisfactorily for a long time. The loose and soft strata, containing mostly chlorite, phlogopite, marl, and powdery iron ore, are mostly in the vicinity of the ore deposit. In this type of strata, flushing and drilling are both difficult. This paper describes a double-barrel drilling tool designed by the author and colleagues for the special purpose of taking core samples in the loose and soft strata. The structure of the drill tool is described and illustrated.

AUTHOR: None

ORG: Ore Prospecting Department, Third Geological Team, Gansu Provincial Bureau of Geology

TITLE: "Method of Bridging a Drill Hole Introduced"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 50, 52

ABSTRACT: In the drilling process, additional core specimens may be needed, the flushing water may be leaking and the leak may be relatively high from the bottom of the drill hole, the curvature of the hole may not meet the design requirements, or a particular layer may have to be enclosed, and so forth, to cause it necessary to build a "bridge" in the hole. Many teams have experimented several ways of using steel wire, spring plug, bamboo splint, etc. to make the bridge, but the building may take a long time and the bridge may not be reliable. This paper introduces the method of using 2 pieces of wedge-shaped wood blocks with a rubber sheet 5mm in thickness in the middle that is slightly larger than the hole. A wire is fastened onto the wood blocks to enable it to be dropped slowly by the drill. When the bridge is at the desired location, a few pieces of stone or gravel are thrown in to immobilize the wood block before the wire is broken to lift the drill. Drawings are given to help explain the bridge building procedure.

AUTHOR: None

ORG: Ninth Geological Brigade, Liaoning Provincial Bureau of Geology

TITLE: "Parallel Dual-Nozzle Hole Bottom Spraying Type Reverse Cycle Drill Tool"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 3, Jun 80 pp 51-52

ABSTRACT: When the strata are sometimes whole and sometimes broken, the method of repeated positive and reverse cycle drilling is often adopted. When the drill is turned from positive to reverse, if there are residual core, drill dust, grains of steel etc. in the hole, the resistance may be great, and the drill rotation may be slowed to cause burned drill in the hole. This sort of occurrence can cause the footage efficiency to drop suddenly. For the purpose of resolving this problem, a parallel dual-nozzle hole-bottom spraying reverse cycle drill tool was designed by the team. It has been used in 3 mining districts and completed more than 1,800m of drilling footage. The results are much better than the single nozzle reverse drilling tool. The properties of the drill tool is described and items to be given attention when the tool is used are explained. There is a drawing depicting the structure of the dual-nozzle drill tool.

AUTHOR: NIU Xingping [6873 1748 1627]

ORG: None

TITLE: "Urgently Promote the Development of Small Caliber Drill Prospecting Work"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 1-4

ABSTRACT: This paper is an excerpt of a speech delivered by the author at the small caliber drill prospecting work symposium in the Ministry of Geology which was held in Jishou of Hunan Province. Hunan Bureau of Geology began in 1979 to acquire 29 small caliber drills to produce an efficiency of 61.8m per drill at a unit cost of 34.75 yuan, i.e. 2.17 yuan less than that of large caliber drills. Now, aside from the 405 team, the 402 team also adopts small caliber drills. The subject of conversion to small caliber drills is one of the 5 key technologies being promoted by the Ministry of Geology. The author hopes that by 1985, small caliberization will be realized by all teams. In the paper, he discusses mainly the current condition of small caliber drill prospecting work and the problem of its future development.

AUTHOR: LI Shijing [2621 0013 0079]
ZHANG Zurong [1728 4371 2837]
XU Xiaojun [1776 2556 6511]

ORG: None

TITLE: "Several Suggestions for Accelerating the Development of Diamond Drill Prospecting"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 4-6

ABSTRACT: Diamond drill tools have the merits of having good quality, high efficiency, few accidents, and less wear. This is the technique adopted for solid ore prospecting in foreign countries, and its superiority has also been proved in domestic applications, especially in regions of low core sample collection rate and serious problem of slanted holes. At present, about 23 percent of the core drill prospecting work of the geological system is done with small caliber drills, still a long way from the target of realizing small caliberization in 10 years. The authors propse a basic reform of the cost accounting method to include wage, workers welfare fund, materials, labor protection fund, outside wages, repair fee, transportation fee, management fee, etc., special assignment of liquid capital assets, improving coordinated equipment assembly, and the adoption of a system of awards and penalties to accelerate the development of small caliber drills.

AUTHOR: HU Zhinan [5170 1807 2809]

ORG: None

TITLE: "Reasons and Regularity of Curvature of Drill Holes and an Investigation Into the Method of Its Prevention"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 6-11

ABSTRACT: It is generally believed that the reason for the appearance of slanted hole is the joint action of the geological factor and the work technique factor. The author believes that the 2 factors must be analyzed separately, while the factor of the drilling design must also be added. In the second chapter of the paper, the principle of curvature of drill holes is discussed at length. The third chapter of the paper is devoted entirely to methods of preventing hole curvature. If the rotation speed of a small caliber drill is not greater than 600-700 turns/minute, and the drill pressure of the diamond bit is reduced 1/5 - 1/3 of normal for strata that will produce slanted holes easily, the result can be much better.

AUTHOR: YAN Shi [6056 1395]

ORG: None

TITLE: "A Selection of Scientific and Technical Achievements in Prospecting Engineering in 1979"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 21-24, 15

ABSTRACT: The paper lists the following accomplishments in prospecting engineering in the year 1979: (1) Diamond drilling: Accomplishments of 14 geological teams, Guangdong 705, Kirin 10, Hunan 408, Jiangxi 916, etc. are reported. (2) Hole protection,leak plugging:Use of synthetic resins, cement, denatured cyano-glue etc. to plug leaks successfully by 11 teams is reported. (3) Measurement of hole curvature, its precention and control: Work of 7 teams is described. (4) Hole bottom motor: Attainments of 8 teams are given. (5) Geothermal well drilling: Work in Xizang is reported. (6) Drill machine, slurry pump, and meters: Products of 19 teams are described. (7) Tunnel prospecting engineering: Work of 5 sites is described. (8) Other: Accomplishments in other subjects by 9 teams are reported.

AUTHOR: XU Guangxin [1776 0342 9515]

ORG: None

TITLE: "Concerning Breakage of Small Caliber Drill Rods and Measures of Prevention"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 46-47

ABSTRACT: Breakage of new drill rods and drill rods before reaching their life span is an abnormal phenomenon, which had continuously occurred in the team to which the author is affiliated. Preliminary satistics revealed 231 such accidents in the team from Jan to Oct 79, to lose 1681 machine-hours, amounting to one machine not being used for 2.3 months. This paper describes the circumstances of these accidents, the reasons learned from analyses of these accidents, and measures adopted to prevent them. These measures are reported to be effective but the paper fails to relate the breakage situation after these measures were adopted.

AUTHOR: LU Fan [7627 0416]
ZENG Renxie [2582 0088 0204]

ORG: None

TITLE: "Application of Sodium Capric Fat Soap in Drilling With Synthetic Diamond"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 48-49

ABSTRACT: Sodium capric fat soap [detergent] is a good negative ion type lubricant, made from a waste residu of making decanedicic acid. The authors first experimented with it at several prospecting teams in Anhui and Hunan, with the support of 311 Brigade of Central South Bureau of Prospecting, which had began to use it as a lubricant in Jul 79 in 5875m of drilling work to the satisfaction of workers and technicians. Decanedioic acid is the raw material for nylon, which is in rapid development in China; therefore, this lubricant may be made very inexpensively. The tests found the lubricant to be satisfactory, except for the fact that it cannot be used for drilling in strata of crystalline limestone and marble.

AUTHOR: WANG Jisheng [3769 0679 3932]

ORG: None

TITLE: "Blast Method of Treating Accidents in the Hole"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 49-50

ABSTRACT: In KANTAN JISHU [PROSPECTING TECHNOLOGY] No 3, 76, the Third Branch Team of the 723 Geological Team of Guangdong Provincial Bureau of Geology reported in a paper the use of in-hole blasting to take care of drill accidents. In Jun 76, the team to which the author is affiliated adopted the method and designed a blasting device for use of that purpose. Since then, the device has been used to treat accidents of fire in holes 100m-820m deep, jammed electric cable, detached hammer, and buried drill, etc. more than 70 times to achieve a success rate of more than 95 percent. The structure of the blasting device, the method of using it, and items to watch for while using it are explained.

AUTHOR: ZHAO Like [6392 4539 0344]

ORG: Chengdu Repair Plant, Sichuan Provincial Bureau of Geology

TITLE: "Reconstructing Old Fashioned Slotting Latheto Finish Rock Core Driving Spring"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 51-52

ABSTRACT: The provincial bureau of geology assigned the team the job of producing a batch of rock core driving springs used with small caliber drills. The grooves of the springs do not fit the drawing machine. The punch machine was tried but the corners of the mold became dull too easily and the surface of the product was not satisfactorily smooth. Finally, a set of hycraulic pressure semi-automatic device was specially designed, with a sinuated blade added to reconstruct an old fashioned slotting lathe for this purpose. With this tool, each spring can be made in 2 plus minutes. The product and the reconstructed tool are described with numerous drawings.

AUTHOR: LOU Enqi [2869 1869 0366]

ORG: Mineral Prospecting Division, Hubei Provincial Bureau of Geology

TITLE: "Fall Preventive Device for the Moveable Work Platform of EDY Drill"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 p 52

ABSTRACT: The moveable work platform is the lift carrying the workers up and down on the drill tower [derrick]. Since it was adopted in the place of a ladder, the work condition improved and labor productivity has been raised also, but a new problem has arisen. Under the condition of careless inspection, improper work procedure, etc.the platform falls or runs away easily to cause fatal accidents. This paper describes a device designed to be attached to the platform to prevent it from sliding down. In actual work condition, however, not a few accidents are caused by runaway platform. This device will not be sufficient to prevent those.

AUTHOR: HUA Daosheng [5478 1129 3932]

ORG: None

TITLE: "Several Problems in Preventing Burnt Cylinder Gasket of Diesel Engines"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 4, Aug 80 pp 53-54

ABSTRACT: The function of the cylinder gasket of a diesel engine is to maintain prolonged and reliable sealing. It must keep the high temperature and high pressure gas tightly sealed in the cylinder yet allow the cooling water and machine oil of a given pressure and flow speed to penetrate through, and at the same time must be able to resist the corroding action of water, gas, and oil. Due to improper use, installation, and repair, the trouble of burnt gasket often occurs. The reasons for burnt cylinder gasket include the quality of the gasket, improper method of removing and replacing the gasket, deformation of the gasket, insufficient protrusion of the gasket above the cylinder plane. This paper discusses these factors separately, and provides respective measures for preventing their occurrence.

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AERONAUTICAL KNOWLEDGE

AUTHOR: LI Cuying [2621 2945 5235]

ORG: None

TITLE: "Test Flight Heroes"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3 Mar 80 pp 2-3

ABSTRACT: On January 3 of this year, the Central Committee of Military Affairs issued the citations of "Scientific Test Flight Hero" to two test pilots: Hua jun (3323 0193) and Wang ang (3769 2491). Hua jun is a 20-year veteran test pilot with little formal education; he had test-flown many Chinese made fighter airplanes. Wang ang, who is a graduate of the Beijing Aeronautical Institute, has been a test pilot since 1966; he had successfully completed 95 test flight missions for the purpose of scientific research. The photographs of these two test flight heroes are shown on the front cover of this issue and a selected number of their contributions to the scientific community are reported in this article.

AUTHOR: LIU Mouji [0491 6180 0165]

ORG: None

TITLE: "Wing Tip Ailerons"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3 Mar 80 pp 14-16

ABSTRACT: Wing tip ailerons are small vertical airfoils installed at the tips of a conventional wing. They are designed to generate thrust forces by taking advantage of the induced cross flows over the upper and lower surfaces of the wing. They can also be installed at an inclined position to generate lift forces and thus increase the lift to drag ratio of the airplane. In addition, they serve the function of weakening the trailing vortices of a large airplane which may otherwise endanger a small airplane flying in its wake. Currently, NASA is continuing its research effort to study the problems of added moment, weight, and vibration associated with wing tip ailerons.

AUTHOR: YEN Litang [2518 4350 1016]

ORG: None

TITLE: "Critical Rotational Speed"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3 Mar 80 pp 20-21

ABSTRACT: The phenomenon of "critical rotational speed" of a rotor is the resonanat vibration of the rotor which occurs when the frequency of a periodically varying external force approaches the characteristic frequency of the rotor. In this article, the author describes an experiment in which the phenomenon of critical rotational speed due to unbalanced centrifugal forces acting on the rotor is demonstrated. The experiment also illustrates the phenomenon of "center of gravity reversal" which explains why rotor vibration diminishes when the rotational speed exceeds the critical speed. In conclusion, the author suggests several rotor designs which will avoid the damaging effects caused by critical rotational speed.

AUTHOR: LIAO Xienwang [1675 0341 2489]

ORG: None

TITLE: "Particle Beam Weapon"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3 Mar 80 pp 26-28

ABSTRACT: Particle beam weapon is a new weapon system which uses particle accelerator in strategic defense and space warfare. The basic components of a particle beam weapon include: the search, discrimination, and tracking subsystem, the particle accelerator subsystem, and the particle beam aiming and tracking subsystem. Because of its potential military value, both the United States and the Soviet Union are actively engaged in the research and development of this new weapon system. In this article, the basic operation of a self-resonant accelerator is explained. The power requirement, the propagation effects, and the destructive capability of a particle beam weapon are also discussed. In conclusion, the technological difficulties and cost considerations in developing a practical particle beam weapon system are reviewed.

AUTHOR: CHEN Bincai [7115 3453 2088]

ORG: None

TITLE: "Evolution of Laser Guided Bombs"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3 Mar 80 pp 32-34

ABSTRACT: During the early 1960's, the United States Army began research and development on laser guidance technology. In 1965, the North American Aviation Company and the Texas Instrument Company both submitted proposals to the Air Force to build laser guided bombs and began prototype designs. During the second half of 1966, both companies engaged in competitive tests to demonstrate the feasibility of their designs. The winner of the competition was the Texas Instrument prototype design, which used an aerodynamically stabilized warhead. Since May 1967, a series of tests were conducted at the Eglin Air Force Base and several technical improvements were made to the original design. In 1968, the laser guided bomb was first used in actual battles during the Southeast Asian war.

AUTHOR: None

ORG: None

TITLE: "Application of Miniature Electric Motors on Space Vehicles"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3 Mar 80 pp 34-35

ABSTRACT: Miniature electric motors are the key components of many devices on space vehicles to perform such functions as automatic control, automatic regulation, automatic measurement, and automatic inspection,etc. Typical applications of miniature motors on spce vehicles include gyroscopes, magnetic tape recorders, spin stabilizers, moment control gyroscopes, gimbal torquing devices, gyroscope torquing devices, and scanning earth sensors.

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CSO: 4009

AERONAUTICAL KNOWLEDGE

AUTHOR: HAN Shijie [7281 0013 2638]

ORG: None

TITLE: "Laser Gyroscope"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 9, Sep 80 pp 16-17

ABSTRACT: Laser gyroscope is an instrument which uses optical principles to measure the angular velocity of a rotating body. Compared with conventional gyroscopes, it has several advantages such as high reliability, short starting time, and high stability. In this article, the structure of a tringular laser gyroscope is described and the basic principle of using laser to measure angular velocity is explained. The so-called "locking phenomenon" at low angular velocity and methods of overcoming this difficulty are introduced. In conclusion, the applications of laser gyroscope for the inertial guidance of tactical missiles, airplanes, and space vehicles are briefly discussed.

AUTHOR: LO Junjie [5012 0193 2638]

ORG: None

TITLE: "Short Range Attack Missile"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 9, Sep 80 pp 18-20

ABSTRACT: The short range attack missile (SRAM) was developed by the United States in the 60's to support long range bombers to penetrate Soviet defense systems armed with SA-2 and SA-3 surface-tp-air missiles. In this article, the basic components of an SRAM which include the body structure, the trigger fusing device, the reserve storage compartment, the warhead, the electronic module, the engine, and the flight control system are described. The deployment procedure of SRAM from a B-52, FB-111, or B-1 bomber and its trajectory characteristics are also illustrated. In particular, the special guidance technique called the "imagined target pursuit technique" used by the SRAM is discussed. In conclusion, current plans for further developing and improving the SRAM are summarized.

AUTHOR: HSU Dekang [1776 1795 1660]

ORG: None

TITLE: "New Drag Reduction Techniques"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 9, Sep 80 pp 24-26

ABSTRACT: In dialogue form, the author discusses several new techniques that may be used to reduce aerodynamic drag: 1) the use of seal skin-like surface materials to maintain laminar boundary layer flow and thus reduce friction; 2) boundary layer control by blowing low speed air stream over the wing surface to reduce frictional drag; 3) the reduction of turbulent flow instability in the boundary layer by mixing minute particles, high molecules, or hydrogen bubbles in the air stream; 4) the use of a thin plastic cover over the wing surface to eliminate surface roughness and reduce total drag.

AUTHOR: HO Yaxi [6320 0068 0363]

ORG: None

TITLE: "Protecting the Airplane's Eyes"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 9, Sep 80 pp 33-34

ABSTRACT: This article discusses the various measures of protecting the radome located at the nose of an airplane. The radome contains the radar antenna which serves the function of airplane's"eyes". Specifically, the following protective measures are discussed: 1) coating of radome surface with polyurethane or other polyester materials to prevent rain corrosion; 2) coating the radome with conducting materials to prevent accumulation of static electricity; and 3) installation of metallic strips over the radome to avoid damages by lightening.

AUTHOR: FENG Xiencheng [7458 3759 2052]

ORG: None

TITLE: "Aerial Electronic Surveillance"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 9, Sep 80 pp 34-35

ABSTRACT: Aerial electronic surveillance systems are primarily used to detect and measure the important parameters of enemy radars from a vantage point in the air. In this article, the operating principle of receivers for radar surveillance is explained. Typical applications of aerial electronic surveillance systems are discussed. They include: 1) threat warning surveillance receivers used on military airplanes for self defense; 2) direction finding and position fixing systems used to guide offensive weapons; 3) surveillance receivers used to direct electronic interference and jamming signals; and 4) electronic surveillance satellites designed to intercept signals emitted from enemy electronic facilities.

3012
CSO: 4009

AUTHOR: DING Shuxiu [0002 2885 0208]
CUI Xueling [1508 1331 3781]
FU Shoudi [0102 1343 1229]

ORG: None

TITLE: "Experimental Research on High Temperature Oil Well Cement"

SOURCE: Beijing SHINI [CEMENT] in Chinese No 1, Feb 80 pp 1-6, 36

ABSTRACT: When oil, gas wells and geothermal wells of especially high ground temperature gradient in depth of 5000-7000m are drilled, the temperature of the bottom of the well is about 150-200°C. To stabilize a well under such a high temperature condition, it is necessary to use adhesive material of a special technical property, otherwise the strength will deteriorate and permeability increase. In foreign countries, a cement-sand mixture, a slag-sand mixture, or a red mud- sand mixture, and β-C_2S and quartz sand are used as the base to proceed with hydrothermal reaction for one of the 3 materials to produce the high strength and heat resistant stability needed for these wells. The authors studied the above 3 systems of adhesive materials separately. The paper discusses the method and ratio of mixing high temperature oil well cement and its work parameters, the physical and mechanical properties under the condition of high temperature hydrothermal condition, the effects of retardants, and hydrothermal reactions and phase compositions of the hydroxides under the condition of high temperature and high pressure.

AUTHOR: None

ORG: Changzhou Cement Plant

TITLE: "Comprehensive Utilization of 3 Wastes of Cement Rotary Kiln"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 1, Feb 80 pp 7-9

ABSTRACT: Changzhou Cement Plant was established in 1958, with 2 common, small standing kilns and a designed capacity of 32,000,000 tons of No 400 cement per year. It was expanded in 1974 to add a small rotary kiln of the size of ϕ2.4 x 2.2 x 39.3 m. The Institute of Cement Research of the Academy of Construction Materials joined the plant to take on the responsibility of a production intermediate experiment of using high potassium materials to produce cement as well as potassium fertilizer. After 4 years of experimentation and practice, the products have basically reached the indices specified by the State, and a technology certification was granted by the General Bureau of State's Construction Material Industries and the Ministry of Chemical Industry. This paper introduces the work procedure, the major equipment, the capital investment and required materials, and the economical benefits of the technique for utilization of 3 wastes of the cement rotary kiln. Problems in the production process are also discussed.

AUTHOR: GE Baojun [5514 0202 0193]

ORG: Nanping Cement Plant

TITLE: "Introducing the Experience of Using Gangue to Burn Dryer Boiler"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 1, Feb 80 pp 9-10

ABSTRACT: Toward the end of 1977, the author and colleagues succeeded in using gangue in the dryer boiler. Production of the plant's ϕ 1.5 x 12 m rotary dryer boiler has been normal for these 2 years. The chemical composition of the gangue of Shaowu Anthracite Mine and the Huainan Bituminous Coal Mine is given. Specifications of the rotary dryer boiler are described. The use of gangue to replace coal has produced a saving of 3,000 tons of anthracite and bituminous coal at the plant. After burning at 900°C, the slag of 70-80 percent of the gangue used contains 3 percent of carbon and more than 80 percent of silicon dioxide and aluminum trioxide, which are good cement mixture materials. The gangue slag was found in experiments to be of similar quality as that of volcanic ash for making cement. All in all, the use of gangue has realized a saving of about 100,000 yuan per year for the plant.

AUTHOR: ZHU Dalong [2612 1129 7893]

ORG: Institute of Cement Research, Academy of Construction Materials

TITLE: "Experiment With Burning Inferior Coal in Decomposition Furnace"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 1, Feb 80 pp 11-14

ABSTRACT: With the development of the new technique of decomposing cement outside the kiln, studies on using oil or coal in the decomposition furnace have both succeeded. A work process was designed to test the feasibility of using inferior coal or gangue in small decomposition furnaces. This paper reports the experiments and discusses the problems of the amount of heat produced and the structure and uniformity of the cooked material. The paper concludes that under current experimental condition, the bituminous gangue of Jingxi Coal Mine and Kailuan Coal Mine cannot be burned in the decomposition furnace, but when bituminous coal is used as a starter or to form a mixture to release about 2000 C/kg of heat, then burning is possible although slow. If volatility of mixturereaches 15 percent to release 2400-2500 C/kg of heat, the mixture can burn easily and fast. The composition of inferior coals from various regions varies a great deal; therefore, it may be said that about 40-70 percent of the fuel of the decomposition furnace may be inferior coal.

AUTHOR: ZHENG Kunyuan [6774 6924 3293]

ORG: None

TITLE: "On Several Problems of Vertical Kiln Production"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 1, Feb 80 pp 44-47

ABSTRACT: At present, the production of vertical kilns in the more than 3,000 cement plants of varying sizes has been greatly improved, but there remain a few shortcomings, such as unstable burning, uneven quality of products, low productivity, etc. This paper discusses mainly problems of quality of the clinker produced by the vertical kilns. Problems include failure to control the quality of raw materials, in the various stages of mining, transportation and storage, the quality of the limestone is often less than standard. The percentage composition of various raw materials in the mixture is often less than stable. For improvement, a composition of 0.87-0.92 KH, 2.0-2.3 of n and 1.3-1.8 of P is suggested. The major portion of the paper contains suggestions for improving the vertical kilns and the work procedure. The method, suggested in a foreign country, of adding a small amount of soluble salt to reduce the melting point of the nodules locally as the salt is shifted to the surface in the drying process to overcome the problem of uneven burning in the vertical kiln is also recommended.

AUTHOR: None

ORG: Harbin City Songhuajiang Cement Plant

TITLE: "Improving the Quality of Vertical Kiln Clinker by Mixing Aluminite in the Raw Material"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 1, Feb 80 pp 48-49, 65

ABSTRACT: The design capacity of Songhuajiang Cement Plant is 32,000 tons per year and for a long time, the production stayed at about 40,000 tons, with the quality of the cement varying a great deal. Especially in the 6 months long winter, the quality had been very difficult to guarantee. Basically 2 factors affect the quality of clinker of the vertical kilns: (1) The chemical composition and physical state of the raw material; (2) The duration and condition of the material in the various temperature zones in the kiln and especially the temperature of the high temperature zone and the speed of cooling. In terms of the raw material, the quality of the limestone was not stable, the sand content of the clay was too high, and the aluminum content of the raw material was too low. Beginning in Sep 78, a method was adopted to raise the Al_2O_3 content to increase the formation of C_2S and reduce fCaO by adding 5 percent aluminite (amounting to about 30 percent of the clay). Since then, the quality of the cement has been obviously improved. The quality did not drop during the severe winter months, and a batch of No 600 cement was produced in the frigid weather.

AUTHOR: LI Guoqi [2621 0948 4388]
LIANG Chaoqun [2733 6389 5028]

ORG: Both of Tangshan 422 Cement Plant

TITLE: "Proposed Reconstruction of Dry Method Rotary Kiln With Residual Heat Furnace"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 1-4

ABSTRACT: In China, about 80 percent of the dry method rotary kilns have residual heat furnace. Tangshan 422 Cement Plant originally has 6 dry method rotary kilns of different specifications with 5 residual heat furnaces; the capacities of the two are not coordinated. The exhaust of 2 kilns enters one residual heat furnace to cause poor ventilation. Another furnace has insufficient drawing capacity to cause it necessary to exhaust portion of the waste gas of 2 kilns through the chimney. For reconstruction, the authors suggest the 2 basic principles of (1) Using the new technique of suspension decomposition preheating to expand the productivity of the kilns; (2) In the second stage, when the electrical power supply is sufficiently enlarged, the power generating system of the residual heat furnace may be eliminated and the kiln exhaust be directed to the decomposition furnace and the raw material preheating system to form a standard decomposition furnace outside the kiln. Problems related to the proposed 2-stage reconstruction plan are discussed.

AUTHOR: LIU Shuzu [0491 6615 4371]

ORG: None

TITLE: "On the Technological Characteristics of Extra-kiln Decomposition Furnace"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 5-7

ABSTRACT: In the SF kiln system adopted in Japan, the exhaust of the rotary kiln is mixed with air 3 times before entering the decomposition furnace to be used for burning as well as heat exchange medium before further entering the preheater system. The design of China's first horizontal oil-fueled decomposition furnace has a different flow process. The decomposition temperature is generally at 900°C. If the temperature of the kiln exhaust is above 1000°C, it is useful for the furnace. But, as the temperature of the exhaust is 880-930°C, it does not supply the furnace with heat energy. Two changes are proposed in the paper: (1) If the temperature of the exhaust is low, the flow process should be changed; (2) The flow process may remain as designed, but the gas temperature of the kiln should be raised and measures should be taken to prevent obstruction.

AUTHOR: SHEN Guoxing [3088 0948 5281]

ORG: None

TITLE: "On High Position Placement of the Material Slurry Pump"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 8-15

ABSTRACT: In China's wet production cement plants, the material slurry and the clay slurry are both delivered by pumps. A single suction suspended arm centrifuge pump is used for material slurry and is installed lower than the surface of fluid to be sucked for inverse feed. The shortcoming of this characteristic is the fact that the upward suction capability of the pump is not used. In many power generating plants in China, the ash and slag pump is placed higher to produce a very satisfactory operation. This paper defines some terms used in pump technology to clarify certain confusion related to the desired position of the pump, and provides various calculations to demonstrate the merits of the high position placement of the pump.

AUTHOR: PANG Lixiang [1690 4539 3276]
LIU Zhilan [0491 1807 5695]
SUI Qinxiang [7131 3830 7449]

ORG: All of Institute of Cement Research, Academy of Construction Materials

TITLE: "Fast Volume Analysis of Cement Raw Material"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 23-29

ABSTRACT: The authors changed the work procedure by using a silver crucible instead of the platinum dish. A high alkaline solution is used to dissolve the specimen before adding a high density acid to produce a transparent solution. Various amounts of the solution are used to determine the silicon dioxide, ferric oxide, aluminum trioxide and titanium dioxide, calcium oxide, and magnesium oxide contents. Methods of chemical analyses of clayey and the iron ore material are explained in separate chapters.

AUTHOR: WANG Shaokun [3769 4801 0981]

ORG: Xiaoshan Cement Plant

TITLE: "Charts for Approximate Calculation of the New Standard Cement Clinker Average Grading"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 30-31

ABSTRACT: Based upon the method of calculating the average grade of cement clinker announced by the Ministry of Construction Materials, this paper presents 2 charts for quick reading of the grade of the clinker based upon the 3-day , 7-day, and 28-day tensile and compressive strength data respectively.

AUTHOR: SHI Zongcan [2457 1350 3503]

ORG: Nanyang District Cement Plant

TITLE: "Simplified Method of Calculating the Result of Cement Production Control Analysis"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 32-33

ABSTRACT: In production control analyses, the various standard solutions such as the potassium perchromate for determining ferric oxide,etc. are mixed according to the densities given in reference books and equations or charts must be used after results are obtained from the analyses. This process is time consuming and error of computation occurs easily. This paper introduces a new density for preparing the various solutions. The computation program may thus be eliminated. The titer milliliter value is the percentage content desired.

AUTHOR: WANG Xianke [3769 3759 4430]

ORG: Comprehensive Machine Shop, Lanzhou Steel Mill

TITLE: "Iodine Phosphate Volume Method of Determining Fe_2O_3 in Cement Raw Material"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 33-34

ABSTRACT: The theory of the method introduced in the paper is to dissolve the specimen with phosphoric acid before adding hydrochloric acid to break down the complex compound produced from phosphoric acid and iron to convert the iron into an oxide. KI is added to reduce Fe^{3+} to Fe^{2+} and separate out I_2. Using amylolytic powder as the indicator and $Na_2S_2O_3$ to separate out iodine. The reagents used and the test procedure are explained.

AUTHOR: None

ORG: Department of Technical Inspection, Guiyang Cement Plant

TITLE: "Opinions Concerning Improving the Method of Determining SO_3 in Fluor Aluminate Cement"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 p 35

ABSTRACT: In various degrees, fluor phosphides are introduced into the raw materials of several types of fast setting cement produced by the Guiyang Cement Plant; therefore, strong acid positive ion exchange method can no longer produce correct result of the SO_3 content. The $BaSO_4$ method may produce accurate results, but it is too time consuming. The paper suggests some improvements to the original $C_{12}H_{12}N_2 2HCl$ volume method of determining SO_3 by (1)Use boiling water and large quantity of positive ion exchange resin to stir NH_4Cl for 10 minutes; (2)"Use $C_{12}H_{12}N_2NCl$ filter fluid to wash the precipitate twice before washing with cold water" should be changed to washing with cold water 2-3 times; (3) Instead of measuring a given quantity of water and boiling it, water should be boiled first before measuring 100-150 ml. The theory of the suggested improvements and the method of analysis are explained.

AUTHOR: LI Zhikun [2621 3112 0981]

ORG: Chemical Testing Laboratory, Guangxi Metallury Construction Company

TITLE: "Using Chemical Method For Fast Determination of Cement Grade"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 36-37

ABSTRACT: Strength is one of the major quality indices of cement. If the standard method is used to test strength, 28 days are needed to grade the cement. Beginning in 1964, the company has studied the use of chemical method to determine the grade of the cement. A series of tests were conducted and measures to eliminate the influence of various factors were proposed, to produce finally a method of using 0.05N hydrochloric acid standard solvent, 0.1 g of sodium anhydrous carbonate, and 1-2 drops of methyl red. The theory of the chemical method to derive the compressive strength of cement in 3.5 hours instead of 28 days is described, as well as the reagents and work procedure.

AUTHOR: None

ORG: Physics Laboratory, Institute of Cement Research, Academy of Construction Materials

TITLE: "Electric Powered Stretch (Break) Resistance Machine"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 38-29, 34

ABSTRACT: In China, the old lever style machine for testing tensile and break resistance of cement requires the worker to lift a bucket of lead pellets and is, therefore, very labor intensive and inconvenient. A new machine was designed using fixed weights moving on a level to determine the load. The work theories and the test results of the old and the new machines are compared. The structure of the new machine and its work procedure are described and illustrated with drawings.

AUTHOR: LIU Yuqi [0491 3768 3825]

ORG: Jinan Cement Plant

TITLE: "Device for Automatic Control of Mesh of Wet Sieve"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 40-42

ABSTRACT: Wet sieve is a creation in China for sieve analysis; it is more accurate, faster, and less labor intensive than the dry sieve technique and has now been extensively adopted by cement plants all over the country . In new regulated cement standards, wet sieve method is also listed as one way of inspecting the fineness of cement. The current wet sieve process has many required test conditions and depends entirely upon workers to manage and control the various stages. The work procedure is complex and certain error is difficult to avoid. The Jinan Cement Plant installed an automatic device to control the mesh and stablize the test conditions. The sequence of movements of the electronic components in the automatic control device is described. A water tank is used to stablize the water pressure, electromagnetic valve and mercury switch are used to control the water table [level], a relay and electromagnetic valve are used to control the analysis time, a motor gearshift and a relay are coordinated to control the rotation of the sieve. The work procedure of the control device is explained.

AUTHOR: QI Wenkun [7871 2429 0981]

ORG: Songhuajiang Cement Plant

TITLE: "Cement Automatic Sample Taking Device"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 42-43

ABSTRACT: Most recently a cement Sample taking device was designed and installed at Songhuajiang Cement Plant at the material input funnel of the machine that lifts the cement in the packing machine shop. In the past, two physical chemical technicians were required to used a "tester" to fetch a sample from every bag of cement. The two must work more than one hour to obtain samples from every one hundred tons of cement. With the new sample-taking device, the analysis technician just go to the machine shop once a day to fetch the samples taken by the automatic device. The device may be set for the desired interval and quantity of sample taking. The structure of the automatic sample-taking device is described and illustrated.

AUTHOR: SUN Shuyuan [1327 2579 3293]

ORG: Tianjin Municipal Cement Plant

TITLE: "Production of ϕ 3.6 x 10 m Short and Large Tower Style Standing Kiln"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 pp 44-50

ABSTRACT: This paper reports the design production condition of the ϕ 3.6 x 10m standing kiln. The production practice using that kiln at the Tianjin Municipal Cement Plant has proved that the kiln has the merits of high quality cement and economical production. It is estimated that the successful design of this kiln will contribute substantially to the technical reform and production development of China's small cement industries. The design and the production parameters and capacity of the kiln are described at length.

AUTHOR: ZHONG Wei [6945 7614]

ORG: Gannan Cement Plant

TITLE: "Photoelectric Cement Package Counter"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 2, Apr 80 p 50

ABSTRACT: Ordinarily, after cement is packed in packages at a cement plant, they are moved on a conveyor belt, while a worker or workers must count the packages on the belt manually. The author and colleagues designed and installed an automatic counter. A light source A is installed on one side of the conveyor belt and a photosensitive diode A' is installed on the opposite side. When a package of cement is moved passing the AA' line, a photo pulse is generated. It is changed into an electrical pulse by the internal electronic circuit of the counter, which records and displays the pulses. A number is constantly displayed to show how many packages has passed the line as long as the conveyor is in operation and the light source is turned on. The machine is simple and reliable, but the electronic circuit remains too complex to cause the cost of the counter to be too high.

AUTHOR: YU Chen [0151 6591]

ORG: None

TITLE: "Suggestions Concerning Work Adjustment of Rotary Kiln Production"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 1-8

ABSTRACT: Under the condition of identical kiln diameter and production conditions, compared with kilns in foreign countries, Chinese rotary kilns are 15 percent lower in heat generating capacity of wet method kilns and 17 percent lower with standing wave kilns, and 6.2-16.3 percent lower in cross-section negative load wet method kilns. The kiln gasket has 4 times shorter useful life than foreign kilns, however. These data indicate that not only the level of technology is low in China, the quality of the materials is still inferior. The quality of the clinker produced in China is below the British Standard, the heat consumption is higher, and the dust dispersion is 3-5 percent greater. This paper analyzes the difference and the reasons causing the difference as well as proposes changes of the work process to improve rotary kiln production in China for the purpose of catching up with rotary kiln production records of foreign countries.

AUTHOR: LI Jiansen [2621 1696 2773]

ORG: Tangshan Design Institute, First Cement Industry Academy of Design

TITLE: "Investigation Into the Method of Computing Wheel Belt of Rotary Kiln"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 8-15

ABSTRACT: Horizontal deformation of the cylinder of the rotary kiln affects the life of the kiln lining and the rotation rate of the kiln. This contradiction becomes more noticeable as the size of the kiln grows larger. For reasons of manufacturing, material supply, transportation, and economy, the thickness of the cylinder cannot be increased to reduce the rate of deformation. Practices and theoretical studies have proved that the structure, method of installation, and assembly of the wheel belt have significant effect on cylinder deformation, especially, the wheel belt must have a sufficient strength. The design calculation of the strength and durability of the wheel belt has, therefore, become one of the key problems in design, maintenance, and trouble analysis of rotary kilns. Considerations in designing wheel belt of rotary kilns are discussed in considerable detail in the paper.

AUTHOR: DAI Shaosheng [2071 1421 3932]

ORG: Tongji University

TITLE: "Power Computation of the Nodule-forming Plate"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 15-18

ABSTRACT: Nodule formation is an important work procedure in vertical kiln and standing wave kiln cement production. The quality and quantity of nodule production have direct effect on the productivity of the kiln, quality of the clinker, and such economic indices as heat and electricity consumption, etc. Although there have been many studies on the work parameters of the nodule-formation plate, the author and colleagues have discovered in practice that the power computation equations of the nodule-formation plate remains theorectically less than perfect. Results of computation are very different from actual measurement data. This paper analyzes the existing equations and suggests changes.

AUTHOR: WU Zhaozheng [0702 0340 2973]
CHENG Xibi [2052 1585 1732]
HUANG Wenduan [7806 2429 4551]
LUO Shuxian [7482 3219 1288]
LIU Cuiyu [0491 5050 3768]
LIN Chunyun [2651 2504 3768]

ORG: None

TITLE: "Experimental Research on Improving Early Stage Strength of Slag Cement"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 19-24, 36

ABSTRACT: China's annual production of slag silicate cement is more than 20,000,000 tons, by 30 large and medium plants and most of the small plants. The quantity is the highest among China's cement products. In property, the long term strength is high and water resistance is good, but the early stage strength is less than ideal. A 5-point program of (1) improving the quality of clinker; (2) grinding it reasonably fine; (3) selecting the slag mixture; (4) increasing the gypsum quantity; (5) mix in other additives was carried out in Huaxin Cement Plant under the condition of not adding manpower and equipment and not affecting existing production. Detail data of the study program are reported.

AUTHOR: None

ORG: Physical Laboratory, Academy of Construction Materials

TITLE: "A Discussion of the Method of Testing Pulverized Coal Ash Activity"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Apr 80 pp 25-30

ABSTRACT: Pulverized coal ash is the industrial residue of coal burning electrical power generators. At present, following the development of electrical power, China's yearly production of such ash is more than 30,000,000 tons, while only 2,900,000 tons of this ash a year is utilized. Most of the ash,more than 90 percent of it is flushed out to allow it to occupy cropland, obstruct streams and rivers, and pollute the environment. It is in fact a very good active cement mixing material. Considering the fact that this ash is not entirely the same as volcanic ash and the fact that its dry shrinkage is less, and its break resistance is better, it has now been listed in China's new regulation on cement; a new standard for pulverized coal ash is needed. This paper compares the activity indices for such ash in the USA, USSR, Japan, Bulgaria, and China and reports an experiment using rotary kiln clinker of 7 plants to test the results of chemical analyses and ISO test of the activity of the pulverized coal ash.

AUTHOR: WANG Wenyi [3769 2429 0034]
ZHANG Datong [1728 1129 0681]

ORG: None

TITLE: "Analysis of Factors Affecting Softness and Hardness of Cement"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 30-36

ABSTRACT: China's new standard for cement has been officially in force since 1 Jan this year. One of the important element of the new standard is that the hard test for strength is changed to soft test. Due to the fact that the soft test cannot correctly reflect the action of the cement in plastic concrete, some grades are no longer factual. In mixing concrete, ordinary cement and slag cement of the same grade do not produce the same result. This paper discusses the major factors, including KH, CaO content, silicate ratio, aluminum content, K_2O, Na_2O contents, etc. on the strength of the cement, based upon test data of many large and medium cement plants in China.

AUTHOR: CHEN Xiaoqing [7115 2556 7230]
LIU Shoushan [0491 1343 6365]

ORG: CHEN of Xi'an Municipal Cement Plant; LIU of Shaanxi Xinchuan Cement Plant

TITLE: "Rejustment Tuning of Frequency Sensitive Variable Resistor"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 37-41

ABSTRACT: Frequency sensitive variable resistor is an electrical instrument designed and produced in China. It is used to start coil type induction motors. It has a simple structure, is long lasting, and convenient to repair, but it is not a linear component As the impedance of motors is different, it is difficult to compute the timing accurately. Cases of burned motors and short circuit are not rare when the frequency sensitive variable resistor is not correctly adjusted. This paper reports a technique of converting the resistor to eliminate its shortcomings. Several samples are given to illustrate the needed adjustment in accordance with the parameters of the motor.

AUTHOR: YU Jiunan [0151 1432 0589]

ORG: Shunde Cement Plant

TITLE: "Several Technical Measures to Improve the Quality and Quantity of Production of Tower Style Vertical Kilns"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 42-46, 48

ABSTRACT: The Shunde Cement Plant has a vertical kiln of ϕ 2.5 x 10 m. The inside ventilation is relatively even to provide a favorable condition for enlarging the diameter of the kiln. This paper reports the methods of enlarging the diameter of the kiln, increasing the air in the middle of the kiln, reconstructing some mechanical parts, and redesigning the work procedure to improve the productivity and the quality of products of the kiln.

AUTHOR: None

ORG: Huaxin Cement Plant

TITLE: "Condition of Use of High Voltage Static Electricity Dust Remover Installed at Turning Point of the Slag Delivery Conveyor Belt"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 47-48

ABSTRACT: This paper reports a simple dust remover. It is composed of the 3 parts of a special transformer silicon rectifier, and control device, and a sealed belt cover. Its dust removal efficiency is above 90 percent. The structure of the device is described. Diagrams are given to illustrate the manual control device and the assembly of the various components.

AUTHOR: JIN Xing [6855 2502]

ORG: Shanghai Cement Plant

TITLE: "Pulse Forced Air Delivery"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 49-50

ABSTRACT: In foreign countries, pulse forced air delivery is used to transport many articles, including drugs, grain, cement, sugar, etc. It is especially suitable for transporting granular or powered materials of less than 8 mm in diameter. It can transport several to several tens of tons to a distance as far as 1000 m. In China, this type of device is used for transporting flour, sand used to make cast molds, etc. The Shanghai Cement Plant installed such a device in connection with its slag dryer in its Second Plant toward the end of 1978, Very good result has been obtained. This paper introduces the theory of this device and the work procedure in the Second Plant. A drawing depicting the work process of the entire machine is included.

AUTHOR: TONG Haizhou [0157 3189 1558]
QIAN Ruzhong [6828 3067 0022]

ORG: TONG of Yongdeng Cement Plant; QIAN of Sichuan Institute of Cement Research

TITLE: "Pre-breaking Technique for Wet Method Raw Material Grinding"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 51-55

ABSTRACT: For the purpose of improving the grinding quality and reducing power consumption, Yongdeng Cement Plant added a hammer type machine to break the limestone in 3 stages before the raw material of the wet method is ground, to make the grains of the limestone smaller. After the adoption of the pre-breaking procedure in 1963, the productivity of the mill was raised 40 percent while the power consumption was reduced 25 percent. Effects of the pre-breaking process on the size of the grain of the material entering the mill are studied. The pre-breaking process is described.

AUTHOR: ZENG Deqian [2582 1795 0356]

ORG: Guangzhou Municipal Chatou Cement Plant

TITLE: "Proposed Design of a Vertical Kiln With Top Spray Blowing"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 55-57

ABSTRACT: Practice proved that the major factor limiting further enlargement of the diameter of the vertical kiln is the poor boundary wind resistance to cause the ventilation on the horizontal cross-section to be uneven. For a long time, with respect to reconstructing the vertical kiln, considerations have usually been given to the burning medium, the chemical composition of the nodular material, and its physical property. Very little thoughts have been given to improving the poor ventilation condition of the middle of the kiln. This paper is an attempt to analyze the reason for the imbalance of ventilation between the center and the edge, and proposes a method of spray blowing from the top of the kiln. Drawings are given to explain the author's analysis of the situation and his proposed solution.

AUTHOR: FU Qingfu [0265 1987 1788]

ORG: Shandong Boshan Cement Plant

TITLE: "Understanding in Using Vertical Kiln to Produce Ordinary No 500 Cement Entirely"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 3, Jun 80 pp 58-60

ABSTRACT: Measures were adopted by Shandong Boshan Cement Plant to reconstruct its work procedure to improve the quality of its products. The major techniques include using the ϕ2.5 x 10 m tower style and ϕ 2.6 x m disk style vertical kilns to produe from black raw material only, increasing the satuation ratio, and reducing the free lime content. As a result, in 4 months of continuous production, its ordinary No 500 cement products have had a qualifying rate of 100 percent. The concrete measures adopted are described.

6168
CSO: 4009

AUTHOR: QI Likuan [2058 4539 1401]
LUO Yuchang [5012 3768 7022]
YANG Siming [2799 1835 2494]

ORG: All of Shandong Aluminum Plant

TITLE: "The Removal of Sulfur Compounds in Soda-Lime Sintering Process for Production of Alumina"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 299-304

TEXT OF ENGLISH ABSTRACT: Sodium sulfate is formed from pyrite and other sulfur compounds in the raw materials, such as bauxite and limestone, and in fuels, such as coal and fuel oil employed during sintering, causing higher soda losses during the process and giving trouble to a number of operations, for instance, the ring-formation in the rotary kilns. The addition of anthracite, as a reducing agent to the raw mix for the kiln-feed, will reduce most of the sulfate into ferrous sulfide, which would eventually be removed from the process with red mud. This method has been successfully employed in alumina plants of soda-lime sintering process and Bayer sintering combination process

[Continuation of JINSHU XUEBAO Vol 15 No 3, Sep 79 pp 299-304]

in China since 1961. Plant operating results as well as experimental data, together with a brief discussion, are presented.

AUTHOR: LIU Baochen [0491 1405 3819]

ORG: Changsha Institute of Mining and Metallurgy Research

TITLE: "On the Action of Shotcrete Support"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 305-318

TEXT OF ENGLISH ABSTRACT: The method of shotcrete for roadway and shaft support has been developed in no fewer than 50 underground metal mines in China, but so far a theoretical analysis is lacking.

Since the deformation on the support and that on the contact plane of the rock mass are identical, and at the same time taking into account the reaction of the rock mass on support, the correlation of stress-strain and displacement of rock mass in the roadway and shaft of a circular cross section under conditions of the plane strain varying with time may be viewed on a rheological model of rock mass. Hence, the corresponding expression for the distribution of stress and strain over the rock mass and the equation for calculating stress-strain and displacement of shotcrete support are worked out. The formulae of thickness and strength in various designs required for shotcrete thus obtained are reliable for engineering practice.

AUTHOR: LI Yuewu [2621 6460 0710]
CHEN Dong [7115 2639]

ORG: Both of Shenyang Designing Institute of Aluminum and Magnesium Industry

TITLE: "Beneficiation of Diaspore-Kaolinite-Bearing Bauxite by Flotation"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 319-322

TEXT OF ENGLISH ABSTRACT: Results of the beneficiation of the diaspore-kaolinite-bearing bauxite by flotation from laboratory and small-scale continuous processing to pilot plant testing are described. Using raw materials with initial Al_2O_3/SiO_2 ratio of 4.6-5, the flotation concentrates finally attained a ratio greater than 8 with a recovery of Al_2O_3 amounting to 70-80 percent.

Results of the digesting test for producing alumina by the Bayer process, as well as tests for making comprehensive utilization of the flotation tailings, are also presented.

AUTHOR: GAO Peiyu [7559 0160 6877]

ORG: Beijing Institute of Iron and Steel Technology

TITLE: "Effect of Hydrogen on the Martensitic Transformation in a 18-8 Austenitic Stainless Steel"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 323-328

TEXT OF ENGLISH ABSTRACT: Martensitic transformation of a 18-8 austenitic stainless steel cathodically charged of hydrogen has been investigated by means of optical microscopy, scanning electron microscopy and X-ray analysis. It is shown that hydrogen promotes the transformation of martensite and the α'-martensite is formed next to the ε-martensite, accompanied by the formation of surface microcracks. The effect of hydrogen on crystal defects has been regarded as responsible for the aforementioned phenomena in such steels.

AUTHOR: XU Zuyao [1777 4371 5069]

ORG: Shanghai Jiaotong University

TITLE: "A Thermodynamical Study on Martensite Transformation in Fe-C Alloys"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 329-338

TEXT OF ENGLISH ABSTRACT: An approach to further investigation of the recent understanding on martensite transformation has been developed after reviewing the relevant previous works. In particular, the physical meaning of the following formula has been clarified:

$$\Delta G^{\nu\rightarrow M} = \Delta G^{\gamma\rightarrow\alpha} + \Delta G^{\alpha\rightarrow M}.$$

The concept of estimating and the means of calculating $\Delta G^{\alpha\rightarrow M}$ have been dealt with, and the method for treatment has been refined. Calculation of $\Delta G^{\gamma\rightarrow\alpha}$ has been made with certain newer data. The theoretical M_s value given by direct thermodynamical treatment agreed fairly well with that obtained by typical experiments. It is shown that the M_s of pure iron is 800 K, and a linear relationship exists between M_s on the one hand, and the carbon concentration of the alloy or the yield strength of austenite at M_s on the other. The driving force

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of phase transformation increases with the increase of carbon concentration and with the decrease of M_s.

AUTHOR: WANG Yunshi [3769 0336 1395]
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GUAN Xueming [7070 1331 6900]
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WANG Jingyun [3769 2529 7291]
LIN Shuzhi [2651 2885 2435]
XU Anshuang [1776 1344 7175]

ORG: None

TITLE: "Effect of Silicon on the Transition of Brittleness in a Nickel Base Wrought Superalloy"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 339-350

TEXT OF ENGLISH ABSTRACT: The tensile strength, ductility or impact value of a wrought nickel base superalloy Ni-15Cr-6W-3Mo-2Al-2Ti depends markedly upon the silicon content of the alloy. In plotting these mechanical properties vs the silicon content, which ranges from 0.1 to 0.89 percent, a saddle shown by the existence of a minimum at about 0.4-0.6 percent Si occurs. There is reason to believe that such a saddle behavior may be caused by the variation of mechanical properties with the type, amount and morphology of carbides as well as

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with the sequence of carbide precipitation in the alloy as influenced by its silicon content. Thus, the amount of M_6C and $M_{23}C_6$ precipitated along the grain boundaries would appear to proceed in four stages as follows:

1. For silicon content up to 0.1 percent, globular $M_{23}C_6$ may be the sole type of carbide formed;
2. In the range from 0.1 to 0.4 percent Si, besides $M_{23}C_6$, M_6C begins to appear and increases with the increase of silicon content. The morphology of the carbides seems to be different, however, being in a discontinuous, blocky form;
3. In the range from 0.4 to 0.6 percent Si, continuous films of M_6C were present. As might be expected, this type of carbide is very detrimental to the tensile and impact properties at room temperature. The precipitation of $M_{23}C_6$ was slowed down or even suppressed;
4. In the range from 0.6 to 0.89 percent Si, M_6C may be altered to discontinuous, blocky form, whereas $M_{23}C_6$ may be very much limited.

In conclusion, the detrimental effect of carbide is mainly associated with its film-like morphology, especially along the grain boundaries. Of course, carbides in granular form are good strengtheners.

According to the prevailing view, criterion for the formation of either M_6C or

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$M_{23}C_6$ in nickel base superalloys would seem to be the relative Mo and W contents, e.g., if $Mo + 1/2\ W > 6\%$, M_6C will be formed. The present work indicates that silicon plays an equally important role in the formation of M_6C in addition to the Mo and W contents of the wrought nickel base superalloys.

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TITLE: "Correlation Between Structure and Magnetic Properties of Amorphous Gd-Co Films"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 351-358

TEXT OF ENGLISH ABSTRACT: The structure of amorphous Gd-Co films 400-700 Å in thickness has been studied by electron diffraction and results of the radial distribution functions (RDF) have been obtained for five samples. In comparing the RDF for two of the samples with perpendicular and in-plane anisotropy respectively, it is shown that a correlation between the nearest neighbor coordination of different kinds of atoms in the amorphous Gd-Co films and its magnetic anisotropy may be established.

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TITLE: "Crystallization Process and Domain Structure of Amorphous Gd-Co Thin Films"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 359-361

TEXT OF ENGLISH ABSTRACT: The crystallization process of Gd_{17}-Co_{83} sputtered thin films has been examined by electron microscopy and electron diffraction. The samples showed a typical amorphous feature at room temperature and a crystalline state under 550°C. It was observed that the crystallization process of Gd_{17}-Co_{83} films underwent a change from an amorphous state through two steps of metastable phases I and II, and then into a stable state finally. The metastable phase II, however, was not a single phase, but was a mixture of several complex metastable phases. The influence of temperature on the domain structure of amorphous Gd-Co thin films has also been studied.

AUTHOR: None

ORG: Laboratory of New Materials, Research Institute of Baotou Iron and Steel Company

TITLE: "The Stability of $SmCo_5$ Permanent Magnet During Long-Term Aging"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 362-366

TEXT OF ENGLISH ABSTRACT: The stability of $SmCo_5$ permanent magnet prepared by liquid phase sintering was found to depend substantially on its intrinsic coercitivy and hysteresis loop squareness. A set of curves concerning initial irreversible loss, irreversible loss during long-term (up to 10,000 h) aging and total loss (including both reversible and irreversible) under certain elevated temperatures (e.g., 250°C) against H_{ci} and H_k has been plotted.

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SU Huihe [5685 2585 0735]
ZHU Guiqiu [2612 2710 4428]

ORG: None

TITLE: "An In-Situ Observation of the Microprocess of Failure by Ductile Fracture in Steel"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 367-372

TEXT OF ENGLISH ABSTRACT: The microprocess of failure by ductile fracture under tensile stress in specimens of two carbon steels containing 0.15 percent and 0.45 percent C respectively and of a 25Cr20Ni-type stainless-steel has been examined in-situ in SEM. Cracking was nucleated preferentially in three different ways, e.g., at the inclusion/matrix, at the twin/matrix boundary and at the σ-phase/matrix interface. In both the first and second cases, the cracks were formed at the interfaces and widened in the steel matrix along the direction of applied stress. In the third case the cracks were nucleated at the

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σ-phase/matrix interface and grew into σ-phase particle. As the applied stress became greater and greater, other cracks nearby appeared to coalesce along the shear direction of the steel with the result of total failure.

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ORG: Central Laboratory of Kunming Iron and Steel Company

TITLE: "Shell-Shaped Fracture in a Medium Carbon Steel Due to Boron Embrittlement"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 373-379

TEXT OF ENGLISH ABSTRACT: The impact fracture of a medium carbon (0.5%C) steel containing boron (0.0005-0.0050% acid soluble boron) has been examined by SEM after various heat treatments. It was found that a shell-shaped fracture occurred only if $Fe_{23}(C,B)_6$ precipitated at austenite grain boundaries was in large quantities and with particle size greater than 2μm, the corresponding impact values of such specimens being extremely low. Such specimens could not be remedied by the usual quency and temper treatment, and re-solution treatment at high temperatures (980-1050°C) followed by rapid cooling to room temperature was necessary to modify the size and distribution of the boron-containing phase, with the consequence of improving properties and eliminating the shell-shaped fracture. Similar fractures were also observed in a 40MnMoB steel.

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TITLE: "An Investigation on the Brittle Fracture of K_I-K_{II} Composite Mode Cracks"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 380-391

TEXT OF ENGLISH ABSTRACT: The extension of the K_I-K_{II} composite mode (K_{II}/K_I = 0-14) cracks has been investigated by means of three-point and four-point band specimens of high or medium strength steels as well as of nodular cast iron. All specimens were broken with brittle fractures under linear elastic plane strain conditions, and the extending direction of the cracks appeared to agree well with the three existing theories, e.g., the theory of maximum stress, the theory of strain energy and the theory of energy releasing rate. The crack extension resistance, however, was found to increase with the increase of the K_{II}-K_I ratio, thus deviating obviously from the theoretical prediction. This finding has been investigated with regard to the following aspects, e.g., the

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configuration and size of the plastic zone, the state of stress at crack tips, etc., and, in addition, the assumption that the crack extension resistance is independent of the deformation characteristics was found to be untenable for specimens undergoing plastic deformation. Attempts have also been made to give a tentative discussion on a simple and reliable analytical method to deal with composite mode cracks for practical purposes.

AUTHOR: Dong Xuemin [5516 1331 2404]

ORG: Central Iron and Steel Research Institute, Ministry of Metallurgical Industry

TITLE: "A Modified Double Cantilever Beam Model for Determining K_{Ic}"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 392-399

TEXT OF ENGLISH ABSTRACT: A modified model of the double cantilever beam in determining K_{Ic} has been proposed. In our model the behavior of the double cantilever beam specimen is characterized by a constant stress intensity factor on the condition that cracks in the specimen propagate under constant displacement conditions. Results obtained from a 4340 steel appear to be in reasonable agreement with the established data.

AUTHOR: YE Hengqiang [5509 1854 1730]
ZOU Bensen [6760 2609 0005]
ZHANG Lixin [1728 4539 2450]

ORG: All of the Institute of Metal Research, Chinese Academy of Sciences

TITLE: "An Investigation of the Inhomogeneity of Mechanical Properties of a Hot-Rolled 10Ti Steel Roll"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 400-405

TEXT OF ENGLISH ABSTRACT: The yield strength of both ends of a hot-rolled 10Ti steel roll was found to be about 10 kg/mm^2 higher than that of its middle. Various factors possibly contributable to such an inhomogeneity in mechanical properties have been considered and supported by experimental investigation. It is concluded that size and distribution of TiC particles are the main cause of the difference in yield strength between the ends and the middle of the roll.

AUTHOR: SU Fengxi [5685 6646 6007]
LIANG Guoping [2733 0948 1627]

ORG: SU of Beijing Institute of Iron and Steel Technology; LIANG of the Institute of Mathematics, Chinese Academy of Sciences

TITLE: "On the Cold Rolling Force Model and Its Adaptive Control"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 406-420

TEXT OF ENGLISH ABSTRACT: The model of rolling force coefficient Q_p has been studied. Three trials of testing showed that macroscopic inhomogeneous draft may occur in the cold rolling of sheets and strips if the parameter $l'/\bar{h}$ is less than a certain value. The coefficient Q_p given by "slab theory" does not seem proper, and should be modified by an amount of $\Delta Q_p \propto (l'/\bar{h})^{-1}$.

Three programs of Q_p model are suggested:

I. for different regions of the parameter $l'/\bar{h}$

$$\text{a) } l'/\bar{h} < 4.2, \quad Q_p = 1.7025 - 0.0402\sqrt{\frac{R'}{H}} - 0.1972\,\gamma\sqrt{\frac{R'}{H}}$$

$$l'/\bar{h} \geqslant 4.2, \quad Q_p = 0.9599 + 0.0130\sqrt{\frac{R'}{H}} + 0.0254\,\gamma\sqrt{\frac{R'}{H}}$$

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$$\text{b) } Q_p = 1.08 + 1.79\,\mu\gamma\sqrt{\frac{R'}{H}} - 1.02\,\gamma$$

$$l'/\bar{h} < 4.2, \quad \mu = 0.0917 + 10.6017/(\dot{\varepsilon})^2$$

$$l'/\bar{h} \geqslant 4.2, \quad \mu = 0.1059 - 0.0005\bar{\dot{\varepsilon}}$$

II. taking into account both homogeneous and inhomogeneous deformation

$$Q_p = 0.6859 - 0.4962\,\gamma + 0.0099\sqrt{\frac{R'}{H}} + 0.1025\,\gamma\sqrt{\frac{R'}{H}} + 1.298\,\frac{\bar{h}}{l'}$$

$$\text{or } Q_p = 0.6903 - 0.5025\,\gamma + 0.0572\,\frac{l'}{h} + 0.0186\,\gamma\,\frac{l'}{h} + 1.29\,\frac{\bar{h}}{l'},$$

III. taking into account the output elastic recovery contributing to roll force

$$\text{a) } Q_p^* = 0.4364 - 0.1350\,\gamma + 0.0229\sqrt{\frac{R'}{H}} + 0.0868\,\gamma\sqrt{\frac{R'}{H}} + 1.5\,\frac{\bar{h}}{l'}$$

$$\text{b) } Q_p^* = 1.08 + 1.79\,\mu^*\gamma\sqrt{\frac{R'}{H}} - 1.02\,\gamma$$

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where

$$\mu^* = \frac{0.0356}{\frac{l'}{h} - 2.503} + 0.0559$$

The parameter Q_p^* seems to be more suitable for the mill of most products but the relevant computation is more complicated.

The physical idea of the equations in program II is explicit and the roll force thus estimated has been found to agree very closely with the experimental data. It is recommended for the rolling of either cold or hot strips as well as heavy plates.

From the results of off-line simulation, however, the accuracy of the model may be substantially improved by the combination of the adaptive control to latter passes of a coil with that of the same pass of the next coil using the program of the exponential smoothing method, the error being reduced to within 10 percent.

AUTHOR: LI Jiabao [2621 1367 1405]

ORG: Institute of Metal Research, Chinese Academy of Sciences

TITLE: "The Error Caused by the Side Declining Angle of the Counter Scanning Plane and Its Effect on the X-Ray Stress Measurement"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 421-432

TEXT OF ENGLISH ABSTRACT: The error in the X-ray stress measurement caused by the side declining angle, γ, of the counter scanning plane is shown to be:

$$\Delta\sigma_X = -(\sigma_Y \sin^2\gamma + \tau_{XY} \sin\gamma \Sigma D_i \sin 2\psi_i)$$

in which $D_i = \frac{\Sigma \sin^2\psi_i - n \sin^2\psi_i}{(\Sigma \sin^2\psi_i)^2 - n\Sigma \sin^4\psi_i}$; n is the number of ψ. Such a relation is being supported by experimental results obtained in our laboratory.

The error in stress measurements along axial direction of a cylindrical surface and certain problems encountered in the X-ray stress measurements of anomalously shaped machine parts are discussed based on the above formula.

AUTHOR: WANG Changzhen [3769 1603 3791]
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ORG: Both of Northeastern Institute of Technology

TITLE: "Determination of the Activity of RE_2O_3 in Liquid $RE_2O_3-CaF_2$ and $RE_2O_3-CaO-CaF_2$ Slags"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 15 No 3, Sep 79 pp 433-437

TEXT OF ENGLISH ABSTRACT: The activity of RE_2O_3 in both liquid $RE_2O_3-CaF_2$ and $RE_2O_3-CaO-CaF_2$ slags at 1600°C has been determined by equilibrating the slag with liquid tin in a graphite crucible under one atmosphere of carbon monoxide. Pure solid RE_2O_3 and pure liquid RE metals were chosen as the standard states and the equilibrium temperature was closely controlled to within ± 2°C. The activity of RE_2O_3 in the reaction $(RE_2O_3) + 3C \rightleftarrows 2[RE]_{Sn} + 3CO\uparrow$ was found to increase with the increase of the concentration of either RE_2O_3 in the $RE_2O_3-CaF_2$ system or RE_2O_3 and CaO in the $RE_2O_3-CaO-CaF_2$ system.

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Semiconductors

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TITLE: "Zone-Variational Method and Its Application in the Computation of Energy Band"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 81-93

TEXT OF ENGLISH ABSTRACT: A zone-variational calculation method for the complex potential field is presented in this paper. The numerical solution of differential equations is used to calculate the wave function in the spherical symmetric zones, while the wave function is expanded in remainder zones with an appropriate basis set. Then, the total wave function and energy are obtained through variational and iterative calculation. This method is applicable to the many atom system, but this paper mainly introduces the application of the computation in band theory. The result of our calculation for Si energy band generally agrees with that of the existing experiments and theoretical calculation. Finally, it is shown that compared to other computational methods in band theory, this method is an effective and convenient one

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for computing the energy band in solids. Although it is an *ab anitio* computational method, its computation effort is much lower. In addition, it is a versatile method and is convenient for self-consistent calculation.

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ZHANG Dianlin [1728 3013 3829]
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TITLE: "Anderson Transition in Silicon Inversion Layers"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 94-99

TEXT OF ENGLISH ABSTRACT: An investigation of the Anderson Transition in MOS inversion layers is given by measuring the dependence of the channel conductivity on gate voltages in the temperature range from 4.2K to 20K. It is found through the experiment that the plots $\ln\sigma \sim 1/T$ do not generally converge as extrapolated to $1/T = 0$. In view of the fact that interface potential fields have not only the microscopic disorders, but also the macroscopic inhomogeneities, the inversion layers can be considered as an inhomogeneous system consisting of many small macroscopic regions with different mobility edges. The

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model of localization for a homogeneous disorder system is used to deal with these small regions. Thus, the results obtained are in agreement with the experimental data, and the treatment is also conducive to the explanation of such "anomalous" effects as the change of mobility edge with electron Fermi energy and the appearance of magnetoconductance oscillations.

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TITLE: "Effect of Components on the Ohmic Contact Resistivity of N-Type GaAs"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 100-106

TEXT OF ENGLISH ABSTRACT: The solubilities of Ga and As in the Au-Ge and Au-Ge-Ni melts with a temperature range of 450°C to 550°C have been measured by using equipment similar to that employed in the liquid phase epitaxy. It has been found that the solubility of Ga and As increases with the increasing of temperature. However, as a result of the vaporization of As, the proportion of Ga to As in the melt increases as well. Beginning from the eutectic composition, either the increase of Au concentration or the addition of Ni to the Au-Ge melt can lead to an increase of the solubility of Ga and As. The cause of increasing solutility is discussed from the thermodynamical point of view. The contact resistivity of Au-Ge and Au-Ge-Ni (or Fe, Cr, Co) system is measured and a discussion is held over this and also over the solubility measurement and calculation of thermodynamic activity. The effect of components on ohmic contact resistivity is analyzed also.

AUTHOR: RUAN Yingchao [7086 5391 6389]

ORG: Heilongjiang University

TITLE: "Theoretical Analysis of the Hall Effect of the Junction Field Effect Transistor"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 107-120

TEXT OF ENGLISH ABSTRACT: In this paper the Hall effect of the JFET is discussed, using standard relaxation techniques. A theoretical evaluation of the Hall voltage and Hall sensitivity of the n-channel silicon devices with various geometries (W/L), impurity concentrations (N), gate voltages (V_{gs}) and drain voltages (V_{Ds}) is made. The results show that the typical voltage Hall sensitivity is about 10 mV/V-kG, and the current-Hall sensitivity is about 10^2-10^3 mV/mA·kG, as $W/L \lesssim 1$-2. Based on that, a JFE-Halltron with high sensitivity, high stability and low noise has been designed.

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TITLE: "A Planar Type GaAs FET"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 121-126

TEXT OF ENGLISH ABSTRACT: A new planar type GaAs MESFET structure is presented in this paper. The results of calculations and experiments for making such a device by O^+-implantation technique are described. It is shown that the planar structure has significant advantages in its microwave characteristics and manufacturing technology over the ordinary mesa type device.

AUTHOR: LIN Yu [2651 7183]
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ORG: Both of the Institute of Semiconductors, Chinese Academy of Sciences

TITLE: "A Two-Layer Logic Circuit"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 127-135

TEXT OF ENGLISH ABSTRACT: The difficulties involved in converting ECL signals into TTL signals in IC circuits are discussed in this paper. The conversion of ECL signals into TTL signals is realized by a new type of flip-flop--the floating flip-flop. Furthermore, a new circuit is presented, which we call "a two-layer logic circuit." The ECL signals in the circuit propagate in an upper voltage-level layer, while the TTL signals do so in a lower voltage-level layer. The main logic functions of sequential circuits are thus completed by the conversion of TTL signals into ECL signals in a combinational circuit and those of ECL signals into TTL signals in the register. Therefore, a four-bit multifunction ALU is successfully made.

The experimental results show that the Two-Layer Logic Circuit has several

[Continuation of BANDAOTI XUEBAO No 2, 1980 pp 127-135]

advantages, such as low power consumption, the ease of interconnections and fewer components used to complete the same logic function. Therefore it is suitable for MSI and LSI.

AUTHOR: XIE Fuzeng [6200 4395 1073]
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ORG: All of the Institute of Semiconductors, Chinese Academy of Sciences

TITLE: "A Design of the Logic Analyzer with Fich Functions"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 136-144

TEXT OF ENGLISH ABSTRACT: This paper suggests a design of a logic analyzer with rich functions, including the ability to compare measured data with reference data. The realization of the logic design without any race-hazard and the theory of the operation of the whole system are described in detail, and the results of the research of the Model LA-781 Logic Analyzer as an experimental sample are given.

AUTHOR: ZHENG Dong [6774 2639]
YANG Yufen [2799 3768 5358]

ORG: Both of the Institute of Semiconductors, Chinese Academy of Sciences

TITLE: "A 4 mm IMPATT Diode Oscillator"

SOURCE: Beijing BANDAOTI XUEBAO [JOURNAL OF SEMICONDUCTORS] in Chinese No 2, 1980 pp 145-161

TEXT OF ENGLISH ABSTRACT: This article presents the design parameters of the 4 mm Si P^+NN^+ type avalanche diode, the manufacture of the diode, the structure of the microwave oscillator and some considerations of its design. It gives some important electrical parameters of the extra reflective cavity stabilized IMPATT oscillator, which are theoretically estimated from an equivalent circuit. It also gives a study on the behavior of the oscillator and its noise through a series of experiments.

The experiments show that the extra cavity stabilized oscillator operates on a frequency range of 70-80 GHz with an output power of over 20 mW (maximal power--160 mW) and an efficiency of about 1-2 percent (maximal efficiency--3.8 percent). The noise behavior of the oscillator is also proved to be

[Continuation of BANDAOTI XUEBAO No 2, 1980 pp 145-161]

superior to a klystron 70V10 in the same band. When it has a deviation of 30 MHz from the carrier, the mean square root frequency deviation of FM noise in a bandwidth of 100 Hz is: $\Delta f_{rms} = 2$ Hz, while for a klystron 70V10 it would be $\Delta f_{rms} = 9$ Hz. The frequency stability of the oscillator is about 3.6×10^{-7}/minute, 1.83×10^{-5}/hour and 5×10^{-4}/200 hours, which is also better when compared to a klystron.

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Silicates

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ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Growth of High Quality Monocrystal Sapphire by Seed-Induced Temperature Gradient Technique (STGT)"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 109-113

TEXT OF ENGLISH ABSTRACT: The various techniques for sapphire growth are summarily reviewed in this paper. It is emphasized that the melt convection in a crucible has a serious effect on the quality of Czochralski crystals; moreover, the STGT of monocrystal sapphire is proposed.

[Continuation of GUISUANYAN XUEBAO Vol 8 No 2, 1980 pp 109-113]

The results show that the qualities of STGT crystals, such as dislocation density, optical uniformity, stress and scattering centers, etc., are better than those of the crystals grown by Verneuil and Czochralski techniques. The advantages and disadvantages of STGT for the growth of large sapphire crystals with high qualities are also discussed.

AUTHOR: ZHANG Lehui [1728 2867 3055/1920]
LIU Lin [0491 3829]
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ORG: All of the Institute of Physics, Chinese Academy of Sciences

TITLE: "Estimation of Transient Growth Rate of GGG Crystals"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 114-120

TEXT OF ENGLISH ABSTRACT: The experimental procedure in the Czochralski growth of high quality GGG single crystals is described. Growth experiments related to the coupling effect of thermal and forced convection in the melt were carried out. Attention had been paid to the inversion of solid-liquid interface during growth and also to the convective flow influence on crystal perfection.

In order to estimate the oscillations of transient growth rate during growth, iridium inclusions were intentionally grown into the crystal, thus the values

[Continuation of GUISUANYAN XUEBAO Vol 8 No 2, 1980 pp 114-120]

of growth rate could be obtained by an empirical relationship between the critical growth rate V_c and the trapped particle size l, viz. $V_c = E/l^m$. Through measurement of the linear sizes of a large amount of iridium particles, the constants of the empirical formula for growth of GGG can be found out, viz. $E = 1.5 \times 10^2$, $m = 1.08$.

AUTHOR: HOU Chaoyang [0186 2600 7122]

ORG: Shanghai Institute of Silicates, Chinese Academy of Sciences

TITLE: "Study of the Growth Habit of $LiTaO_3$ Single Crystals"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 125-129

TEXT OF ENGLISH ABSTRACT: The growth habits of $LiTaO_3$, especially the distribution of growth ridges and facets on crystal surfaces, have been studied in detail. The mechanism of formation of the morphological features is discussed phenomenologically on the basis of the structure model of the unit cell and the appearance of these features explained in the light of structural symmetry of $LiTaO_3$ crystals. The calculated results of the model coincide fairly well with the experimental data obtained.

AUTHOR: ZHANG Kecong [1728 0344 1783]
CHEN Jingeng [7115 6855 1649]
WANG Jiyang [3769 4949 2254]
LIU Qingshun [0491 3237 5293]
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ORG: All of the Research Institute of Crystal Materials, Shandong University

TITLE: "Growth and Perfection of Deuterated Doped Triglycine Sulfate (DATGS) Crystals"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 130-136

TEXT OF ENGLISH ABSTRACT: This article describes the experimental conditions of the growth of Deuterated Doped TGS (DATGS) crystals in D_2O solutions by the slow cooling method and the different types of defects in the crystal and the rule of their distribution as investigated by optical microscopy and X-ray topography. Compared with TGS crystals, the defects existing in DATGS crystals are far more distinct and depend much upon parameters of growth. An attempt has been made to establish the relationship between the perfection of crystals and their growth conditions in order to find out the optimum parameters for the growth of DATGS crystals so as to extend the range of their applications.

AUTHOR: None

ORG: Flux Growth Method Group, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Flux Growth Method for YAG:Nd Crystals and Located Nucleation Technique"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 137-142

TEXT OF ENGLISH ABSTRACT: A new technique of located nucleation by water cooling used in the flux growth of YAG:Nd crystals is described, with optimum melt composition and cooling program given herein. The nucleated numbers have been controlled successfully and fairly good quality crystals of 200-400 g by weight have been produced steadily.

AUTHOR: QIAN Zhenying [6929 2182 5391]
HOU Yinchun [0186 0603 2504]
DENG Peizhen [6772 0160 3791]

ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "A Study of the Quality of Sapphires by X-Ray Diffraction Topography"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 143-146

TEXT OF ENGLISH ABSTRACT: X-ray diffraction topography has been employed in the study of defects in sapphire single crystals grown by Verneuil, Czochralski, Edge-Defined Film-Fed Growth (EFG) and Temperature Gradient Growth (TGG) techniques. In TGG crystals the triangular cross-grid dislocation lines have been noticed and the Burger's vectors thereof determined.

AUTHOR: HOU Lisong [0186 4539 2646]
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ZHU Yuxiu [2612 3022 4423]

ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "An Investigation on the Chemical Durability of Nd-Doped Phosphate Glasses"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 8 No 2, 1980 pp 159-170

TEXT OF ENGLISH ABSTRACT: A new test method has been developed to determine the chemical durability of Nd-doped phosphate glasses of P_2O_5-BaO, P_2O_5-Al_2O_3-Bao and P_2O_5-Al_2O_3-Li_2O-BaO systems in water. The effects of eight metallic oxide substitutes for BaO on the water resistance were investigated. The results obtained were discussed in light of glass structure and the polarization ability of the cations in glass. Based on the mechanism of glass corrosion, it was pointed out that the corrosion rate might be accelerated in some of the glasses tested.

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AUTHOR: YU Daowen [0060 6670 2429]

ORG: None

TITLE: "The Vibration of Drive Spring Coils and Its Dynamic Stress"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 1, Mar 80 pp 1-12

TEXT OF ENGLISH ABSTRACT: The drive spring of a machine gun supports the rapid compression of bolt carrier due to power gas, so its dynamic stress is high. Based on the theoretical analysis of the vibration of spring coils, this paper shows the propagation of dynamic stress along the spring by the graphical method and verifies that the maximum stress is often greater than the static stress occurring when the contiguous coils are in contact. It is believed that in the design of the drive spring, it is necessary not only to use the usual static calculations but also to analyze the dynamic stress so as to obtain rational dimensions.

AUTHOR: ZHENG Zhemin [6774 0772 2404]

ORG: None

TITLE: "Several Problems on Jet Penetration"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 1, Mar 80 pp 13-22

TEXT OF ENGLISH ABSTRACT: It has been established both theoretically and experimentally that the penetration of a well developed jet produced by a hollow charge can be regarded as a quasi-steady state process. Under such circumstances, the penetration process can be characterized by the relation between jet velocity u_j and penetration velocity u.

This paper examines u_j-u relation as well as the penetration of a jet, part of which has broken up into pieces. Five problems are discussed:
1) an empirical u_j-u relation;
2) superposition of the depth of penetration and time relations;
3) a proposal to determine u_j-u relation experimentally;
4) the thickness of the "hydrodynamic" zones;
5) penetration of a broken up jet.

AUTHOR: LU Jiapeng [7120 1367 7720]

ORG: None

TITLE: "A Study on the After-Effect Coefficient β of Automatic Weapons"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 1, Mar 80 pp 23-29

TEXT OF ENGLISH ABSTRACT: In the design of automatic weapons, the after-effect coefficient β is a very important factor which has been studied by many scholars and therefore the resultant empirical formulas and theoretically-calculated formulas have been found. However, there is a certain difference between these calculations and real conditions. In this paper, these results are analyzed and the formulas which are closer to real conditions are given. Therefore, this paper is divided into two parts: the analysis of the achievements made in the past and the calculated formulas which are closer to real conditions.

AUTHOR: GUAN Cunxian [7070 1317 0341]

ORG: None

TITLE: "The Investigation of the Experiments on the Stability of Propellants with Galvano-Coulometric Method"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 1, Mar 80 pp 30-38

TEXT OF ENGLISH ABSTRACT: The principle and procedure of the galvano-coulometric method to study the stability of the thermal decomposition of propellants are briefly discussed in this paper. From the coulometric determinations of nitrogen oxides, the relation between nitrogen oxides liberated from the propellants and the amount of centralite is investigated and the curves showing their variations are obtained. The mechanism of the reaction between stabilizer and nitric oxide and the effect of heating temperature on the stability analysis of double-base propellants are also studied.

AUTHOR: YU Yongzhong [0060 3057 1813]
CHEN Shanmei [7115 3790 1188]
DUAN Baoru [3008 1405 1172]

ORG: None

TITLE: "The Synthesis of Polynitrobenzenes and Their Properties"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 1, Mar 80 pp 39-42

TEXT OF ENGLISH ABSTRACT: We synthesized polynitrobenzenes (trinitro to hexanitro) by oxidation of polynitroanilines by peroxysulfuric acid (hydrogen peroxide dissolved in sulfuric acid, also known as Caro's acid) several years ago. In this method, the concentration of peroxysulfuric acid is very important and the content of SO_3 in sulfuric acid also plays an important role. The effects of some reaction conditions are discussed in this paper.

Although similar methods have been published in the literature recently, what we have investigated still has some advantages in practice. The hexanitrobenzene can be synthesized in a good yield with a much smaller amount of peroxysulfuric acid in a shorter time as compared to the reaction conditions published in the literature.

[Continuation of BINGGONG XUEBAO No 1, Mar 80 pp 39-42]

The detonation properties of polynitrobenzenes were measured and reported for the first time in the literature. These data show that hexanitrobenzene is an excellent high explosive, but it can be easily hydrolyzed into trinitrophloroglucinol.

AUTHOR: XUE Dawei [5641 1129 3634]

ORG: None

TITLE: "A Simplified Method for Calculating Simple-Supported Rectangular-Bottomed Shallow Spherical Sandwich Shells"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 1, Mar 80 pp 43-51

TEXT OF ENGLISH ABSTRACT: In this paper, simple yet more precise formulas have been presented for calculating the membrance shear forces and twisting moments in the vicinity of the corners, and the membrance forces and bending moments at the edges of sandwich shells. All the values of stresses required in the design may be derived from these simplified formulas.

9717
CSO: 4009

AUTHOR: None

ORG: Photographic Surveying Group, Research Institute of Surveying Technology, Chinese Academy of Architectural Sciences

TITLE: "Report of Experimental 1:1000 Mapping of Tangshan by Aerial Surveying"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 3, 22 May 80 pp 16-20

ABSTRACT: After the inordinate damage of earthquake suffered by Tangshan City in 76, an overall large scale aerial mapping project was launched in Aug 78. Incorporating the experience of the 1/1000 mapping of Guyan gained by the group, the group was supported by the Surveying Company of the Fifth Ministry of Machines in matters of instruments and experimental conditions to start the project with experimental mapping of an area measuring 2 km from east to west and 1.2 km from south to north, to the north of Guyan, which is the eastern mining district of Tangshan City. The experiment produced 14 1/1000 maps, with three of these unsatisfactory. The work procedure, the technical requirements, the altitudinal precision, the precision of horizontal sites, and understandings gained from the experiment are reported.

AUTHOR: HUANG Wanli [7806 8001 6849]

ORG: Qinghua University

TITLE: "On the Principle and Method of Developing Ground Water Resources"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 3, 22 May 80 pp 29-31, 47

ABSTRACT: The author claims that underflow is the greatest source of water in a river valley, just awaiting development. For example, the annual precipitation P ↓ of the 121,000 km^2 of the Haihe Valley plain averages 570mm to total 68,7000,000,000m^3 of water. Only one tenth of it becomes surface streams R to flow into lakes, swamps, reservoirs, or rivers to enter the sea. About 5/10 stays in the air-saturated layer of soil E_s ↑, partially to provide for crop transpiration to form the so-called effective rainfall and partially to become intercrop surface evaporation. The remaining 4/10, about 27,500,000,000m^3 seeps to the groundwater surface to join the underflow, in a volume 4 times greater than the surface streams. This underflow may be withdrawn from shallow wells W↑ for irrigation, with the remaining evaporated out of the ground surface E_T.↑. Under the condition of saline accumulation of soils, it joins the surface evaporation. This paper explains the equation of quantitative equilibrium of hydrological movement and the technique of calculating the maximum available groundwater resources for withdrawing in a year: $E_t + W = P - R - E_s$.

AUTHOR: WANG Ruijiu [3769 3843 0036]

ORG: Institute of Geomechanics, Chinese Academy of Geological Sciences

TITLE: "Tendency of Change of the Water Table in Beijing Region"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 3, 22 May 80 pp 32-36, 40

ABSTRACT: In modern times, models are used to study changes of the water table. This paper adopts the hydrologic model of lumped parameter system (Domenico, P.A.: CONCEPTS AND MODELS IN GROUNDWATER HYDROLOGY 1972 pp 47-76) to study the actual data of the region of Beijing, for the purpose of this study, including Sanjiadian in the west, Dingfuzhuang in the east, Qinghe in the north and Nanyuanzhen in the south. Following a general discussion of the hydrologic condition of this area, the principle of change of the water table of the western part and that of the eastern part are analyzed separately. In conclusion, the author maintains that the generally tendency is for the water table to drop, especially in the eastern half, at a rate of 0.5-1.5 m. Although during years of abundant rainfall, the water table of the western half may maintain an equilibrium or even rise, it will drop again in an average or poor year. The aquifer is also receding at an increasingly greater rate.

AUTHOR: LI Zhongming [2621 1813 6900]

ORG: Wuhan Surveying Company of the Ministry of Metallurgical Industry

TITLE: "Concerning the Problem of Evaluating the Engineering Geological Condition of Wuhan Steel Mill"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 3, 22 May 80 pp 67-72

ABSTRACT: From the 1950's to this day, the condition of engineering geology of Wuhan Steel Mill has been surveyed for more than 2 decades. As the surveying work progresses, the understanding of the stratigraphy of the region and the evaluation of the load capacity of the foundation ground are also gradually deepened. This paper is a comprehensive review of the Quaternary Strata of the region of the mill and an assessment of the problem of load capacity of the major strata. It is pointed out that the measured quantity of settling of all the buildings of the mill is in fact much less than the estimated settling, computed with any of several methods of computation. Aside from the fact that the design load is greater than the actual load, the fact that all thesoils in the mill region are all supercompression dense soils, having relatively great initial indurating pressure certainly must be one of the important factors. The interrelationship of these factors and its correct application remain to be a subject requiring further study.

AUTHOR: Su Sen [5685 2773]

ORG: Southwest Comprehensive Surveying Academy, Stat's General Bureau of Construction Engineering

TITLE: "Expansion Soils of the Northern and Central Parts of Sichuan Basin and Their Engineering Characteristics"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 3, 22 May 80 pp 73-75

ABSTRACT: There are extensive distributions of expansion soils in the northern and central parts of Sichuan basin. This paper discusses the problem of foundation deformation of areas of expansion soils, factors influencing it, and the engineering characteristics. The region of this study includes generally 30-32.5° N. Lat. and 104.5-106.5° E. Long. In separate sections, the influence of weather factors, the influence of terrain and topography, the influence of mineral contents, the influence of the physical property of the soil, and the influence of different load conditions on the expansion characteristic are analyzed. In conclusion, the author offers his opinions concerning possible measures of improving the engineering property of expansion soils and of minimizing foundation deformation.

6168
CSO: 4009

AUTHOR: MA Minggang [7456 6900 0474]

ORG: None

TITLE: "A Description of NDT Technique in IIW 32nd Annual Assembly"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 2, Apr 80 pp 1-4

TEXT OF ENGLISH ABSTRACT: This article describes the activities of Commission V of the IIW 32nd Annual Assembly held in Bratislava, Czechoslovakia, 8-14 July 1979. The author briefly summarizes a few of the documents which are considered to be more important together with the author's personal comments. In addition, some documents are translated sectionally and appear in this volume as reference materials.

AUTHOR: SUN Guofang [1327 0948 5364]

ORG: Shanghai Materials Research Institute

TITLE: "Study on the Behavior of Defective Superheater Pipes by AE Technique during Hydraulic Pressure Test"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 2, Apr 80 pp 5-9

TEXT OF ENGLISH ABSTRACT: The AE technique is widely used in material research. A single-channel AE apparatus is used to study the behavior of defective superheater pipes with various kinds of flaws during a hydraulic pressure test. The test results are analyzed and calculated in order to provide data for assessing the quality of pipes.

AUTHOR: JIANG Futang [5592 4395 2768]
CHEN Jinshui [7115 6855 3055]
JIN Zhougeng [6855 0719 1649]
ZHANG Xiukui [1728 4423 1145]

ORG: All of the Beijing Research Institute of Material and Technology

TITLE: "Ultrasonic Inspection of Reinforced Plastics and Sandwich Structures"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 2, Apr 80 pp 10-15

TEXT OF ENGLISH ABSTRACT: This paper gives a brief description of the ultrasonic method, associated mechanical scanning devices and the recording system for inspection of reinforced plastics, bonded components of sheet aluminum--reinforced plastics and sandwich structures of sheet aluminum--foamy plastics --sheet aluminum. The main defects, such as delaminations, cracks and faulty bondings, can be effectively detected. The effectiveness of the method for assuring the quality of large components has been confirmed in long-term production practice.

AUTHOR: ZHOU Zaiqi [0719 0961 2630]

ORG: None

TITLE: "The Measurement of Non-Metal Plate Thickness by Means of Microwaves"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 2, Apr 80 pp 16-19

TEXT OF ENGLISH ABSTRACT: This paper discusses the principle of the measurement of non-metal plate thickness by means of microwaves. The thickness of a non-metal dielectric plate can be found by measuring the amplitude and phase angle of the reflected waves as the variation of reflected waves depends on the dimension and properties of the plate. The tests are carried out with the wave length of X-band (9.4 GC).

AUTHOR: ZHENG Shicai [6774 0013 2088]

ORG: Xinli Machine Plant

TITLE: "Experiment with the Mode-Converted Waves to Detect Defects Near the Central Axis of a Pin"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 2, Apr 80 pp 20-23

TEXT OF ENGLISH ABSTRACT: The author introduced an ultrasonic pulse into a small pin by coupling the normal probe to its top face and analyzed the wave figure between the first bottom echo B_1 and the second bottom echo B_2, determining the possible number and location of the mode-converted waves M_n. It is possible to detect defects near the central axis of a small pin by means of observing the changes of the amplitude of the M_1 wave. In order to verify the validity of the method, some destructive tests were carried out.

AUTHOR: None

ORG: Shanghai Institute of Non-ferrous Metals; Shanghai Jiaotong University; Shanghai Institute of Testing Techniques

TITLE: "Effect of ψ-Fixed and ψ_0-Fixed Methods and Selection of Different Diffraction Intensity Correction Factors on the Accuracy of X-Ray Residual Stress Measurement"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 2, Apr 80 pp 24-29

TEXT OF ENGLISH ABSTRACT: Under the ψ-fixed condition (or the ψ_0-fixed condition), the same stress values were obtained by using either the stationary slit or the parallel beam method. However greater stress values were obtained in the ψ_0-fixed method than in the ψ-fixed one.

When the peak locations (diffraction angle 2θ) were determined by the "three point parabola" method, 2θ values would be dependent on the choice of the tables of diffraction intensity correction factors. However, the influence of different tables on the stress values calculated is not appreciable.

9717
CSO: 4009

AUTHOR: YANG Liansheng [2799 6647 3932]
GAO Deyu [7559 1795 3768]
SUN Baoshan [1327 1405 3790]

ORG: YANG of Changchun Geological Institute; GAO of Hebei Geological Fifth Team; SUN of Institute of Geomechanics

TITLE: "Genesis of Jinchangyu Gold Deposit--Mineralization of Dynamic Metamorphism"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 4, 79 pp 80-97

ABSTRACT: Although Jinchangyu gold deposit, distributed on the deep metamorphic Archaeozoic crystalline bedrock of easter Hebei, has had a history of mining of several hundred years, its genesis is yet to be studied in depth, beyond certain tentative hypotheses. The authors proposed the subject and proceeded with the study of the geological background, the mineral zones, the distribution characteristics, the fragmented schist system, its zonal characteristic and conversion, and chemical analyses, since 1978. This paper reports results of the study. The theory of mineralization of dynamic metamorphism is here proposed, based upon the idea of Prof. ZHANG Qiusheng in his EAST QINLING METAMORPHIC GEOLOGY.

AUTHOR: LAN Yuqi [5695 3768 3823]
YE Tingsong [0673 2185 2646]
LIU Xishan [0491 0823 1472]

ORG: None

TITLE: "New Understandings of the Palaeo-strata Around Sangyuan to the North of Qianan Iron Deposit in Hebei Province"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 4, 79 pp 99-107

ABSTRACT: Sangyuan District is located to the north of the Shuichang Iron Mines of Qianan County, Hebei, separated from the mining district by the river Luanhe. This mineral deposit is in the most ancient strata in China according to current knowledge (36.7 billion years old). In 1979, Changchun Geological Institute cooperated with Shougang Geological Prospecting Company to carry out studies in the area surrounding Sangyuan and discovered a group of metamorphic rocks of the hornblende facies, below the gneiss--migmatite of the Shuichang Mining District. This group appears to be obviously different from the overlaying gneiss strata in rock composition, metamorphic action, and mineral characteristics. Their discordant contact relationship is observable at Houzhuangwu and Shuiquangou. The findings are described. A plain-view geological map of Sangyuan District is included.

AUTHOR: XU Kaizhi [1776 7030 1907]
LIU Anzhou [0491 1344 3166]

ORG: None

TITLE: "An Approach to Palaeographic Characters of Rock Facies and Concentration of Sedimentary Iron Ore Deposit of Devonian System in Nan Tianshan"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 4, 79 pp 107-113

ABSTRACT: Following a description of the evolution and characteristics of the sedimentary facies of the Devonian System in the region of Paergang of Southern Tianshan and the principle of concentration of sedimentary iron deposits, the authors conclude that the Middle Devonian of this region is a period favorable for mineralization. This is the premise to be kept in mind in the process of searching for ferric carbonate ores. The source of materials of this primeval long and narrow basin is undoubtedly both the uplift of Central Tianshan, separated from the basin by the Kawake Fault, and the edge of Talimu [Tarim], with the latter the more important source. The mother rock is mainly a group of lightly metamorphic marl, clastic rock, and silicon carbonate rock systems. There are also some gravel fillers of acid eruptive rocks and tuff to indicate, obviously, that they are related to volcanic activities and are products of the period of magma activity and most violent subsidence of the basin.

AUTHOR: SU Qingxin [5685 3237 1800]
DONG Bin [5576 2430]
TAN Jinhua [6151 6930 5478]
ZHANG Cai [1728 2088]
LI Shiqi [2621 1102 1142]
DING Jishan [0002 4949 1472]
WANG Aihua [3769 1947 5478]
HU Yongtai [5170 3057 3141]

ORG: SU, DONG, TAN, ZHANG of Changchun Geological Institute; LI, DING, WANG, HU Of Jiancai [Construction Materials] 701 Mine; All Members of a Joint Scientific Research Group

TITLE: "Theory and Practice in Diamond Electro-Magnetic Fluid Static Separator"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 4, 79 pp 135-150

ABSTRACT: The group began in 1976 to study ways of making the diamond electromagnetic fluid static separator in order to resolve the problem of selection and mechanical purification of fine-grain grade diamond (-0.5 + 0.2 mm); in primary diamond ores of China, the ratio of fine-grain grade may reach above 20 percent. This paper reports the process and result of the study. The work principle of the separator is also described.

6168
CSO: 4009

AUTHOR: ZHANG Yixia [1728 6813 0204]
YAN Hongquan [7054 7703 6898]
WANG Kuande [3769 1401 1795]
LI Fuyuan [2621 1788 0337]

ORG: ZHANG, YAN of Changchun Geological Institute; WANG, LI of Jidong [Eastern Hebei] Geological Command Department

TITLE: "An Approach to Komatiite in the Qianxi Group of Jidong [Eastern Hebei]"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHUNGCHUN GEOLOGICAL INSTITUTE] in Chinese No 1, 80 pp 1-8

ABSTRACT: A great deal of work has been carried out in the stratigraphy of the old metamorphic rocks of Eastern Hebei (by ZHANG Shuye [1728 2885 2814] et al in 1958-1962.) In 1975, a 3-formations-and-11-groups theme of stratigraphy of this region was proposed by Hebei Region Survey Second Team and has since been commonly adopted and applied to form a good foundation for studying the basic geology and the problem of mineralization principle of the region. The authors agree with the classification of the Qianxi Group of the region, but are of the opinion that more work is needed to clarify the mineralization condition of metamorphic iron ores in the formation. They discovered that the lower strata of the deep metamorphic gneiss often contain thin layers, lenses, and fragments of a dark colored mineral, Komatiite. Just as its surrounding gneiss (metamorphic

[continuation of CHANGCHUN DIZHI XUEYUAN XUEBAO No 1, 80 pp 1-8]

basic lava rocks and tuff) these supermagnesium iron rocks are of a genesis of submarine volcanic eruption. This discovery should be significant in the identification of the primary rock composition of this group of deep metamorphic rocks,in the inquiry into the archaic mineralization environment, and in the assessment of ore deposits of this region. This paper is a summary report of studies on the Komatiite.

AUTHOR: JIN Shiqin [7246 2508 3830]

ORG: None

TITLE: "Study on the Law of Distribution of Iron and Magnesium in the Pair of Paragenetic Minerals in the Grannlite [?] Facies Metamorphic Rocks of Miyun Gaoling District"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 1, 80 pp 23-35

ABSTRACT: The technique of using the principle of distribution of major elements of paired paragenetic minerals as a geological thermometer has become increasingly interested by scientists here and abroad. Since the 1960's, there have been many foreign studies on the subject, but its domestic studies remain very few. This paper attempts to investigate such problems as the metamorphic facies, the related P-T condition, etc. of the Archaeozoic Miyun Formation in the Miyun Gaoling District from the aspects of the distribution principle of iron, magnesium, etc. and the composition characteristics of paired paragenetic minerals. This paper reports the details of the study. The general geology of the district is briefly described to explain the background of the subject matter.

AUTHOR: QI Zhiru [4359 0037 1172]
LIU Hongguang [0491 3163 0342]

ORG: None

TITLE: "Preliminary Study on Several Zeolitic Minerals in the Northeast Region of China"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 1, 80 pp 45-50

ABSTRACT: Zeolite, a water-containing aluminum silicate was first discovered in Iceland more than 200 years ago. To date, 36 types of zeolites have been identified and several of these have become important mineral resources in the petrochemical industry, agriculture, animal husbandry, environmental protection, and as raw material for cement. The structural classification of zeolites was first proposed by Meier in 1960. There are now recognized to be 8 families of zeolites. In Mesozoic and Cenozoic volcanic rocks of the Northeast (Hailin of Heilongjiang, Zhangwu, Chaoyang of Liaoning, Fuyu, Jiutai of Jilin, and suburbs of Changchun City, etc.) a batch of zeolites and zeolitic minerals have been discovered. The x-ray diffraction analyses, the infrared absorption spectra, the heat differential analyses, and the microscopic observations of these zeolites are reported, with preliminary identification of the families of zeolites in the Northeast based upon results of these studies.

AUTHOR: DONG Xuebin [5576 1331 2430]
ZHOU Nanshi [0719 0589 4311]
DING Fengyi [0002 7685 0308]

ORG: None

TITLE: "Preliminary Study on the Geomagnetic Anomalies in the Northeast Region of China"

SOURCE: Chargchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHNAGCHUN GEOLOGICAL INSTITUTE] in Chinese No 1, 80 pp 81-93, 75

ABSTRACT: In recent years, scientists have given increasing importance to the study of problems of the deep part of the earth's crust through research on geomagnetic fields. This paper is an attempt to postulate and analyze the abysmal tectonics and the crust structure of the Northeast Region of China through a study of its geomagnetic anomalies. The paper is prefaced by an introduction of endogenous and exogenous fields of geomagnetic field, the techniques and equations for their observation, measurement, and computation, as well as the work of the Institute of Geophysics Chinese Academy of Sciences in establishing 1889 points of observation in 1970 and the Geomagnetic Map subsequently published by that institute, on which this study is partially based. The major chapters of the paper deal with geomagnetic anomalies of the Northeast and their interpretation, and understandings of the abysmal geological structure and crust tectonics of the region based upon the interpretation.

AUTHOR: ZOU Zurong [6760 4371 2837]

ORG: None

TITLE: "Geochemistry of Stable Isotope and Its Application in the Research of Ore Deposits: Lecture IV: Geochemistry of Sulfide Isotope (Continued)"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 1, 80 pp 114-128

ABSTRACT: This paper concludes the series of lectures on geochemistry of stable isotopes and its application in ore deposit research. The lectures are designed to introduce the general theories of geochemistry of the 2 different types of stable isotopes of lead and sulfur and important problems to be considered when these theories are applied in the study on ore deposits. This installment of the lectures includes the following 3 sections of Lecture IV: (5)Dynamic effect of distillation of sulfur isotopes; (6) Distribution of sulfur isotopes in several major geological bodies; (7) Application of data of sulfur isotopes in studies on the genesis of mineral deposits.

AUTHOR: YAO Fengliang [1202 7364 5328]
ZOU Zurong [6760 4371 2837]
LIU Liandeng [0491 6647 4098]
KONG Qingcun [1313 1987 1317]

ORG: YAO, ZOU of Changchun Geological Institute; LIU, KONG of Zhaoyuan Gold Mine

TITLE: "Evolution of Gold Mineralization in West Jiaodong"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 9-12

ABSTRACT: Jiaodong is one of China's important bases of gold, with more than 200 sites of deposits, and 95 percent of these in a concentrated zone measuring 60 km from east to west, in the region of Zhaoyuan-Ye Counties of the northwestern part of Jiaodong. The rocks containing the gold deposits are mainly granite, belonging to different ages and in the form of multi-phased migmatites. There are obvious temporal gaps of gold mineralization. The gold ore bodies are mostly strictly controlled by the Yanshan fissures and fractured zone structures. Spatially, they are closely paragenetic with vein rocks. Studies on the intersectional relationship of vein rocks and the ore bodies revealed that the gold mineralization was produced in the process of frequent activities of basic rock veins. The sulfur isotope composition of ore body($\delta^{34}S = +6.7^0/oo$) and rock vein ($\delta^{34}S = 6.2^0/oo$) is basically similar. The basic rock veins have a high gold content (0.3118 g/ton); therefore, the gold genesis in the region was undoubtedly related to magma thermal solution. This paper discusses mainly the characteristics of the stages of many periods of gold mineralization and the differences in gold composition and content.

AUTHOR: SUN Weijun [1327 2607 0689]
WANG Fuquan [3769 4395 2164]
ZHANG Mingli [1728 2494 4539]

ORG: SUN of Tianjin Institute of Metallurgical Geology; WANG of Museum of Geology; ZHANG of Shandong Metallurgical Geology Prospecting Company

TITLE: "Filamentary Goethite in the Heiwang Type Limonite Ore Deposit in Luzhong of China--A New Type of Jade Raw Material"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 29-32

ABSTRACT: Goethite is named after the German poet Goethe. It is formed through oxidization and hydrolysis of iron sulfides, carbonates, and silicates. According studies of the author, the Goethite in the Heiwang type limonite in Luzhong [central Shandong] is well crystallized with long filaments and extremely dense and hard. Cracks are very few; the color is even; and the richly varied structural shapes are rarely observed here or abraod. This is a new type of jade material discovered in China for the first time. This paper reports results of a preliminary study. The authors request the attention of geological, metallurgical systems, educational departments, and departments of precious stones and arts.

AUTHOR: SHANG Lin [1424 3249]
LIN Jinquan [2651 6855 2164]
HU Pingying [5170 1627 5391]

ORG: None

TITLE: "Exsolution Structure of the Solid Solution of Magnetite-Lemenite and Iemenite-Titanohematite in Metamorphic Iron Ores in Miyun of Beijing"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 41-44, 54

ABSTRACT: In 1977, the authors discovered in the metamorphic iron ores of the upper part of Miyuan formation of Archaeozoic Era in Beijing, a very rare magnetite deposit with the exsolution structure of solid solution of magnetitie--lemenite and lemenite-titanohematite. This deposit provides an important basis for tracing the history of development of metamorphic rocks and genesis of iron ores in that district and is also beneficial for mineral prospecting. The major geological characteristics of the iron deposit, the solid solution exsolution structure in the titanomagnetite, and the genesis of the solid solution exsolution structure are discussed.

AUTHOR: WAN Pu [8001 2613]
TIAN Xu [3944 3563]
LI Qibai [2621 7871 4101]

ORG: All of Sichuan College of Construction Material Industry

TITLE: "Metamorphism and Origin of Pegmatite in Tuguiwula District of Nei Menggu [Inner Mongolia]"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 45-57

ABSTRACT: In the district of Tuguiwula, which is located on the southern edge of the central eastern section of the tectonic zone of Tianshan-Yinshan of an east-west direction, deep metamorphic rocks of the Tuguiwula group of Jining formation of Archaeozoic Era are extensively exposed. They may be divided into 3 lithological segments of ArJ1, ArJ:, and ArJ_1, of a total thickness of about 2,000m. The boundary line of each lithological segment is clear and straight, with interbedding transition and obvious stratification. It is the opinion of the authors that the Presinian metamorphic actions of this district were repeated and complex, and were closely related to the genesis of pegmatite. The regional superimposed tectonic activities promoted differentiation of deep magma and concentration of volatile elements and determined the formation of micaceous pegmatite.

AUTHOR: ZHU Zhongxiu [2612 6988 4423]

ORG: None

TITLE: "Study on Infraredspectroscopy of Grossular-Andradite Mineral Series"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 58-60

ABSTRACT: This paper reports a study on the principle of changes of infrared absorption spectrum of the grossular-andradite mineral series. This method is shown to be a simple and convenient way of studying the chemical composition of this type of minerals. The molecular ratio of the grossular-andradite series may be directly derived. Infrared absoption data of the CaFe-CaAl garnet series are included.

AUTHOR: WANG Shicheng [3769 0013 4468]
YUAN Qingyang [5373 3237 2254]

ORG: None

TITLE: "Application of Quantification Theory in the Prognostification of Mineral Resources"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 61-92

ABSTRACT: Quantification theory is a polynomial statistical method of handling qualitative data suggested by a Japanese scientist. This paper reports an attempt of using the quantification theory I, III to study the problem of prognosing gold ores in the 1 : 50000 surveyed region of Shuanghezhen in central Jilin. The 380 km^2 surveyed area is divided into 380 squares, treating each square as a unit, the equivalent of a specimen. ~~A serial number is~~ assigned to each of the units to be computed in succession. A concrete computation procedure, the establishment of a complex model of the gold copper anomaly region and its application, and the process of prognostification of the mineral resources are reported.

AUTHOR: PAN Zuoshu [3382 0155 2873]
SHEN Jiangsheng [3947 3068 0524]
WANG Xiaopei [3769 1321 3099]
TENG Jiwen [3326 0679 2429]

ORG: PAN, SHEN, WANG of Changchun Geological Institute; TENG of Institute of Geophysics, Chinese Academy of Sciences

TITLE: "The Character of Airborne Magnetic Anomaly and the Structure of the Earth's Crust in the Southern Qingzang Plateau"

SOURCE: Changchun CHANGCHUN DIZHI XUEYUAN XUEBAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 80 pp 93-101

ABSTRACT: The Qingzang Plateau is an extremely active region of modern tectonics and earthquake and has very special crust and upper mantle structure and material composition. For the purpose of investigating the relationship of the aerial magnetic anomaly of the southern part of this region and the tectonics of the deep part, the aerial magnetic survey data are processed and analyzed. The aerial magnetic map is in a scale of 1 : 200,000, in a precision of ±5 gamma. The flying altitude averages 3000m. The method of processing and interpreting the magnetic anomaly and an analysis of the deep tectonics are reported.

AUTHOR: WEI Kaiyu [7614 7030 3558]
LIN Zhenhua [2651 7201 5478]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "A Computational Method for the Design of Low Energy High Intensity Beam Transport Systems"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 5, 1980 pp 555-562

TEXT OF ENGLISH ABSTRACT: In this paper we have described a computational method of high intensity beam transport systems. This is a step-by-step approximation method. In addition, we have developed the general formulas for the calculation of systems including arbitrary numbers of bunchers.

AUTHOR: YU Qingchang [6735 1987 7022]

ORG: Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "Theory of Nonlinear Space-Charge Effects of Low Energy Intense Charged Particle Beams"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 5, 1980 pp 579-587

TEXT OF ENGLISH ABSTRACT: Nonlinear space-charge effects of low energy intense charged particle beams are studied by an analytical method. The relation between changes of emittance diagrams and initial current density distributions for zero temperature beams is determined. Approximate methods for calculating changes of emittance diagrams for beams of small temperature under the action of nonlinear space-charge field and increment of effective emittance of beams are obtained.

AUTHOR: HE Zejun [6320 3419 0689]
LI Panlin [2621 4149 2651]

ORG: Both of the Institute of Nuclear Research, Chinese Academy of Sciences

TITLE: "Transport Model of Heavy Nucleus Fission"

SOURCE: Beijing GAONENG WULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 5, 1980 pp 640-648

TEXT OF ENGLISH ABSTRACT: Based on the transport theory of nucleons of fission nucleus, we have calculated the mass distribution of ^{235}U fission induced by thermal neutron using the Fokker-Planck equation and in the calculation the kinetic energy distribution and other physical quantities are also obtained. Our results agree semiquantitatively with existing experiments.

AUTHOR: QIU Xijun [8002 6932 6874]
SONG Hongqiu [2646 1347 4428]
HUANG Weizhi [7806 0787 1807]
WANG Zixing [3769 1311 5281]

ORG: All of the Shanghai Institute of Nuclear Research, Chinese Academy of Sciences

TITLE: "A Model of Fission"

SOURCE: Beijing GAONENG SULI YU HE WULI [PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS] in Chinese Vol 4 No 5, 1980 pp 680-682

TEXT OF ENGLISH ABSTRACT: Mass and kinetic energy distribution of fragments in thermal-neutron induced fission of ^{235}U are calculated by an α decay-like model. In addition to Coulomb and nuclear interactions, the deformation and intrinsic excitation energies of fragments are also taken into account.

9717
CSO: 4009

AUTHOR: WANG Zhe'en [3769 0772 1869]
SU Baorong [5685 1405 1166/1369]
HU Shaoyi [5170 4801 5902]
et al

ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "2KW Transverse-Flow Closed-Cycle CO_2 Laser"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 1-4

TEXT OF ENGLISH ABSTRACT: The combination of a closed-cycle, transverse-flow 2KW CW CO_2 laser is described with emphasis on the arcless electrode construction and glow discharge stability is appreciably increased at a more intense input current. The direct current output characteristics of the main supply and the selection of the ballast resistor greatly affect the glow discharge stability and the output power.

When the gas flow velocity in the discharge region is 40 m/s, the gas mixture

[Continuation of JIGUANG Vol 7 No 7, Jul 80 pp 1-4]

pressure is 46 mm Hg, the length of the active region is 86 cm, and a CW multimode output power of more than 2 KW and an electro-optic efficiency of about 15 percent are achieved.

AUTHOR: YAO Guangtao [1202 1639 3447]

ORG: North China Research Institute of Electro-Optics

TITLE: "Constitutional Supercooling and Segregation of Solute in the Growth of Nd:YAG Crystals"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 5-8

TEXT OF ENGLISH ABSTRACT: Many defects in Nd:YAG crystals grown by the Czechratski method are caused by constitutional supercooling and segregation of local solute appearing in the boundary layer near the grown interface. These are analyzed and effective measures are proposed to eliminate conditions for constitutional supercooling and solute segregation.

AUTHOR: YU Lisheng [5713 7787 3932]

ORG: Department of Physics, Beijing University

TITLE: "Voltage-Current Characteristics of GaAs-$Al_xGa_{1-x}As$ Double Heterojunction Lasers"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 9-12

TEXT OF ENGLISH ABSTRACT: Voltage-current characteristics of GaAs-Al_x-$Ga_{1-x}As$ DH laser diodes have been measured at different temperatures in the range of 77-300 K. Typical characteristics in the forward bias of many investigated diodes can be described by:

$$I = I_1 + I_2 = I_{s1}\exp(AV) + I_{s2}\exp(\frac{q}{nkT}V)$$

where A and n are parameters weakly dependent on temperature.

AUTHOR: XIE Ziming [6200 2737 6900]
CHEN Shaohe [7115 4801 0735]
CHEN Lanrong [7115 5695 2837]
YANG Sheshui [2799 1410 3055]

ORG: XIE, CHEN Shaohe and CHEN Lanrong all of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences; YANG of Shanghai No 3 Reagent Plant

TITLE: "Pentamethylidyne Dye for Mode-Locking in Nd^{3+} Lasers"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 13-16

TEXT OF ENGLISH ABSTRACT: Physical, chemical and mode-locking properties of pentamethylidyne dye for mode-locking in Nd^{3+} lasers are given. Several factors which affect the stability of the dye solution with 1, 2-dichloroethane as the solvent have been found. A method for increasing the stability of the dye is presented. Pentamethylidyne dye is proved to be a good and inexpensive dye for mode-locking as compared with undecamethylidyne.

AUTHOR: CHEN Shisheng [7115 2514 0524]
ZHAO Qingchun [6392 1987 2504]
WANG Xiaoqin [3769 4562 3830]
DING Liming [0001 7787 2494]

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Compensation of Laser Beam Wave Surface Aberration"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 17-20

TEXT OF ENGLISH ABSTRACT: Methods for compensating for the wave aberration of the high power Nd glass laser beam are summarized, and the methods for adjusting, machining and testing the aspherical lens for compensation are also given. In the experiments of laser beam aberration compensation, the practical laser beam aberration is decreased from 2.3λ to $\lambda/2 \sim \lambda/4$.

AUTHOR: WANG Shiming [3769 0013 2494]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Technique for Indium Sealing by Rubbing Coating"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 21-22

TEXT OF ENGLISH ABSTRACT: The technique for indium sealing by rubbing coating is described. He-Ne laser tubes, standard pulsed xenon lamps thus sealed and the fusion technique of glass with copper, glass with stainless steel and quartz with aluminum is reported.

AUTHOR: CHEN Zuxiong [7115 4371 3574]

ORG: Shanghai Institute of Chemical Engineering

TITLE: "Characteristics of Light Transmission of the Optical Fiber with Tapered Input and Output Ends"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 23-27

TEXT OF ENGLISH ABSTRACT: The relationship between divergent angle and structure of the optical fiber with tapered ends for light transmission is discussed. It is shown that the diverging characteristics for the output light are only related to the structure of the output end, and a small divergent angle can be obtained with ends of longer lengths and smaller conical angles. The input end acts as a mode filter which makes the divergent angle for the optical fiber independent of the divergent angle for the input beam. This feature is explained by the theory of geometric optics.

AUTHOR: FENG Xiqi [7458 6932 3217]
SHAO Lixun [6730 7812 1053]
ZHANG Tianli [1728 3240 4539]

ORG: FENG of Shanghai Institute of Ceramics, Chinese Academy of Sciences; SHAO and ZHANG both of Radio Works No 6, Shanghai

TITLE: "High Speed Pyroelectric Detectors"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 28-33

TEXT OF ENGLISH ABSTRACT: In this paper, the design and fabrication of high speed pyroelectric detectors made from $LiNbO_3$ and $LiTaO_3$ crystals are described, including calculation and measurement of detectors' responsivities and comparison of laser damage threshold of four kinds of materials in common use; the generation mechanism of pyroelectric resonance and its elimination are discussed.

AUTHOR: WANG Runwen [3769 3387 2429]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Separation of Photoelastic Fringes and Measurement of Internal Spatial Stresses"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 34-37

TEXT OF ENGLISH ABSTRACT: A brief review is given on the analysis of photoelastic stress including interferometric and holographic methods. It is pointed out that the successful separation of isochromic fringes from isopachic ones by using the photoelastic method is an experimental breakthrough. A new method is proposed for separating the isochromic fringes from the isopachic fringes by optical information processing.

AUTHOR: SHAN Guiqing [0830 0964 1987]

ORG: Harbin Measuring and Cutting Tools Works

TITLE: "Contrast of Photoelectric Output Signal and Its Relationship to the Error of Counting Pulse Interval in Laser Interferometry"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 38-40

TEXT OF ENGLISH ABSTRACT: The importance of choosing the ratio of the width of the light transmitting slit to that of the interference fringes is dealt with. It is also pointed out that the largest signal contrast and the largest signal amplitude can be obtained when the width of the interference fringes approaches infinity. In addition, a relation between the signal contrast, the signal D.C. shift and the error of the counting pulse interval is given. Accordingly, the quality requirements for photoelectric output signals can be determined through the tolerance of the counting pulse interval.

AUTHOR: LIANG Xiangchun [2733 0686 2504]
JIANG Yuzhu [5592 3768 2691]
TANG Baozhen [3282 1405 3791]
SHI Aying [2457 7093 5391]

ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Laser Shearing Interferometer with Two Plates"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 41-45

TEXT OF ENGLISH ABSTRACT: Operation principles are analyzed for a transversely shearing interferometer with two plane plates and with a laser as the light source, with parameter selection for the interferometer given. The interferometer was used in measuring the laser beam wavefront.

AUTHOR: HUANG Yihe [7806 0110 0735]

ORG: Shanghai Institute of Laser Technology

TITLE: "Holography with a Multimode Laser"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 46-47

TEXT OF ENGLISH ABSTRACT: A simple method is proposed to eliminate multimode interference fringes in holographic reconstruction without, at the same time, causing restriction on the stereoscopic feeling reconstructed images.

AUTHOR: HUANG Maoquan [7806 5399 0356]
LI Hong [2621 5725]

ORG: Both of the Department of Physics, Shanxi University

TITLE: "Two Problems about the Power Supply for High Repetition Rate Solid State Lasers"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 48-50

TEXT OF ENGLISH ABSTRACT: Two difficulties that arise in controlling the charging voltage and in preventing the faultily conducting phenomenon in a resonance charging repetition rate solid state laser power supply are discussed and effective measures for suppressing them are proposed.

AUTHOR: ZHAO Kun [6392 3824]
YE Xiaozhu [5509 1420 3796]
WANG Ruhou [3769 3067 0230]
WANG Peilin [3769 0160 3829]
WANG Hongzheng [3076 1347 2973]

ORG: ZHAO, YE, WANG Ruhou and WANG Peilin all of Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences; WANG Hongzheng of Anhui Institute of Electrical Power Experiments

TITLE: "Non-Contact High-Voltage Measurement with Laser Beam"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 51-55

TEXT OF ENGLISH ABSTRACT: An experiment of transverse modulation at a voltage of 150 kV, 50 Hz is presented, with a He-Ne laser as the light source and an electro-optic crystal $LiNbO_3$ as the Pockels' cell. Its maximum relative error is $n_{max} = 7.7$ percent, and average relative error is $\overline{n} \leqslant 2.0$ percent.

AUTHOR: JIN Linfa [6855 2651 3127]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Protective Film in Laser Thin Film"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 56-59

TEXT OF ENGLISH ABSTRACT: Using SiO_2 as protective film laser thin film can raise the laser-resistant intensity by one to two-fold. This is determined from both the plasma flash and the damage of thin film flaws.

AUTHOR: LIN Wenqing [2651 2429 7230]
LI Jinxian [2621 6855 6343]
CHEN Wenzhou [7115 2429 0719]
HUANG Guanlong [7806 7070 7893]

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "An Automatic Measurement Device for Weak Laser Energy"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 7 No 7, Jul 80 pp 60-61

TEXT OF ENGLISH ABSTRACT: The configuration, parameters, behavior and error analysis of an automatic measurement device for weak laser energy are reported. The measured energy of laser pulses ranges from 50 mj to 0.2 mj with an accuracy of better than 10 percent.

9717
CSO: 4009

AUTHOR: LUO Ning [5012 1337]
LIU Tingjie [0491 1694 2638]

ORG: None

TITLE: "A Brief Summary of Papers Read at the Conference of Management of Combat Casualties"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 1, Feb 80 pp 1-7

ABSTRACT: In general, the rescue and treatment work performed for the wounded of this war [against Vietnam] is much improved over the condition of past wars against aggression fought by the liberation army; the rate of recovery is higher, the rate of mortality and disability from wounds is lower. The basic problems of rescuing the wounded from battle, including shock, infection, cleaning the wound, choice of anesthetics, and complications from injuries are discussed, based upon the experience of this war. The second portion of this report deals with treatment of limb, spinal, abdominal, chest, cranial, eye, ear, nose, and facial injuries of combat. The final portion deals briefly with problems of nursing the wounded. The date and location of the conference for exchanging experience are not mentioned.

AUTHOR: LIU Bingcun [0491 3521 1317]
CHENG Dongyuan [4453 2639 3293]
DUAN Guosheng [3008 0948 0581]

ORG: None

TITLE: "Treatment of Encephalocele Due to Injury of Combat"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 1, Feb 80 pp 7-9

ABSTRACT: The authors treated 91 cases of skull penetrating injuries from combat. Of the group, 14 victims were complicated by encephalocele. Pathogenesis of the complication includes 5 cases of traumatic brain edema, 5 cases of intracerebral hematoma, 3 cases of infection of wound deep in the brain, and 1 case of encephalopyosis. Treatment includes surgical and nonsurgical measures. All cases were cured. The paper contains an analysis of clinical data, introduction of 4 case hisotires, and a discussion of the pathogenesis, diagnosis, and treatment of such cases.

AUTHOR: WANG Minhuan [3679 3046 2037]
HUANG Yueqi [7806 3022 3825]

ORG: None

TITLE: "Understandings in the Treatment of Gunshot Wounds of the Abdomen: Report of 85 Cases"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 1, Feb 80 pp 13-15

ABSTRACT: The hospital [unnamed] to which the authors are affiliated has treated 85 cases of combat injuries of the abdomen; three of the group died following surgery. Wounds included those of the small intestine, colon, rectum, liver, gall bladder, ureter, spleen, stomach, pancreas, kidney, urinary bladder, and vessels. The clinical data, the surgical technique, and the postoperative complications are reported. Based upon the experience gained from treating these cases, the authors discuss the importance of early diagnosis and timely treatment, careful inspection of the abdomen to prevent some wounds from being missed, correct handling of wounds of various organs, and avoiding infection of the abdominal wall and cavity.

AUTHOR: LIU Shanbao [0491 6365 1405]
WANG Sulan [3679 4790 5695]

ORG: None

TITLE: "Immunological Examination of Perforating Wounds of the Eyeball"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 1, Feb 80 pp 16-19

ABSTRACT: Serum immune globulin test, lymph cell conversion test, white cell swarm suppression test, indirect blood coagulation test, etc. were performed for 40 patients suffering from perforated wound of the eyeball. These immunological examinations were carried out 14-41 days following the injury, and again 30-40 days after the first series of tests. With some of these cases, prolonged inflammation of the injured eye occurred. Is the inflammation a form of infection? Is it a form of auto-immune reaction? Or, is it a manifestation of complex factors? Answers to these questions remain unclear. Results of the tests are reported at length.

AUTHOR: TAO Qimin [7118 0366 2404]
FENG Bofang [7458 4102 5364]
WANG Jinqi [3769 6855 3825]
LI Xinfu [2621 2450 1381]
LIU Yuzhen [0491 3768 6297]
YANG Shouzhun [2799 1343 4783]
ZHOU Jiwen [0719 4949 2429]
LI Juru [2621 0193 1172]
SONG Baokun [1345 1405 2492]

ORG: TAO, FENG, WANG, LI, LIU of Hepatic Diseases Research Laboratory, Department of Examinations, Beijing Colleg of Medicine People's Hospital; YANG, ZHOU, LI, SONG of Immunology Laboratory, People's Liberation Army 302 Hospital

TITLE: "Large Scale Preparation of Hepatitis B Core Antigen From Cadaver Liver Tissue by Zonal Gradient Ultracentrifugation"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 1, Feb 80 pp 47-50

ABSTRACT: The authors began in early 76 the HBcAg research work; preparation of HBcAg from cadaver livers of 5 carriers got underway by the end of 77. Large quantity purification with zonal gradiant ultracentrifugation was successful on 8 Dec 77 for the first time, then successively in Feb and May 78. Twice in 79, success was again obtained from 11 and 1 cadaver livers, the last one being a case of nephritis with positive blood HBsAg. The reagents, instruments, and method used, and the results are reported.

AUTHOR: LYU Shicai [0712 1102 2088]
HOU Tiesheng [0230 6993 0524]
LI Chengyong [2621 2052 3057]

ORG: None

TITLE: "Experience With Treatment of 228 Cases of Missile Inflicted Limb Fractures in a Frontline Hospital"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 3, Jun 80 pp 129-131

ABSTRACT: During the defensive war against Vietnam, the authors were assigned to a certain field hospital to take on the job of treating the wounded. This paper reports a group of 228 cases of open fracture of the limbs, with most of these having additional injuries in other parts of the body and reaching the hospital within 24 hours after being hit by missiles. Of the group, 66 victims were in shock; all recovered with treatment. The anti-shock treatment, the procedure for cleaning the wounds including concrete surgical measures, and problems relating to postsurgical fixation of the limbs are discussed. There was no fatality in the group. On 23 Feb 80, the first author, since deceased, of the Department of Osteopathy, the Second Hospital of the Second Military University of Medicine, was awarded the title of Model Military Physician by the Central Committee of the Army.

AUTHOR: LIU Mingduo [0491 2494 6995]
ZHANG Songbo [1728 2646 2672]
LIAO Xian [1675 6343]

ORG: None

TITLE: "Intracranial Hematomas Due to Missiles and Their Classification"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 3, Jun 80 pp 131-133

ABSTRACT: This paper analyzes the clinical data of 35 cases of missile inflicted intracranial hematoma treated at the first line [of battle] and the second line hospitals. Of the group, 25 patients were in coma at the time of surgery and 17 patients had relatively large points of bullet-entry. There were 6 fatalities in the group, amounting to 17.1 percent. Hematomas observed are divided into the 4 types of those at the point of entry, those at the central part of the wound passage, those of the blunt end of the wound, and those at the exit of the bullet. The authors caution that the second and the third types may be easily missed.

AUTHOR: XUE Shanyi [5641 6365 4135]
YAO Haiying [1202 3189 5391]

ORG: None

TITLE: "Observations of the Relationship Between Vestibular Caloric Response in ENG and Visual Interference of Pilot"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 3, Jun 80 pp 150-154

ABSTRACT: It has often been suspected that accidents caused by visual error of pilot are induced by asymmetrical reactions of vestibules of both sides. In the past 2 years, the authors tested 30 pilots of the army having serious records of such errors, with a group of 32 normal pilots serving as the control. Tests were performed with a modified Fitzgerald and Hallpike technique of filling the vestibules with water of different temperatures, left 44°C and right 30°C, etc. in duration of 30 seconds and intervals of 5 minutes. The volume of water was 250-300ml. An electronic scanning device was used to record ophthalmodonesis in the entire duration, with the eyes of the pilots closed. No obvious differences were detected among the 2 groups of pilots. Failure of fixational suppression and paradoxical caloric response were not revealed. The paper reports details of the test results and discusses vestibular functional disorders and their effects on the ability to pilot airplanes.

AUTHOR: LIU Jingchang [0491 2529 2490]

ORG: None

TITLE: "Present Status of Helium-Oxygen Diving in China and Its Physiological Studies"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 3, Jun 80 pp 170-173

ABSTRACT: In Oct 62, experimental helium-oxygen diving was successful for the first time in China in 13 person-times to a simulated depth of 160 m. All divers were safe and sound after the experiment. In Jul 65, the technique was effectively applied for engineering and construction of the submerged portion of the Nanjing Yangzi Bridge. Since then, repeated experimental studies and ocean training work have further improved China's helium-oxygen deep diving technology [no specific data given in the paper, however.] The major portion of the paper deals with problems of the medical-physiological aspects of deep diving, the decompression disease in general, and the helium-oxygen decompression disease in particular. Development of medical protection work for helium-oxygen diving , not particularly in China, is very briefly discussed.

AUTHOR: ZHAO Xuezhong [6392 1331 1813]
QIAN Wanhong [6929 8001 4767]
BAO Mingrong [7637 2494 2837]
ZHANG Yingkuo [1728 2019 7059]
JIANG Zhikuan [1203 1807 1401]

ORG: None

TITLE: "A Report of Experimental Control of Mosquitoes in Underground Tunnels With Several New Insecticides"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 3, Jun 80 pp 178-180

ABSTRACT: Due to the fact that ventilation is poor in underground tunnels and trenches the common and highly toxic insecticides such as DDT, DDVP, etc. cannot be used if human beings cannot vacate the site in advance. For the purpose of searching for insecticides against mosquitoes useable with persons present, several new insecticides derived from Dalmatian chrysanthemum including pyrethroid, pyrethrins, resmethrin, etc. were tested in enclosed areas measuring $2m^3$ each. Culex mosquitoes were fed blood for 3-7 days before being used in the test. After each type of insecticide was sprayed, mosquitoes were placed in the test site and observed continuously for 30 minutes. The number of dead mosquitoes was recorded and the fatality rate computed. A control group of identical mosquitoes and site with no drug application was furnished for each test. All insecticides were found to be effective in slightly varying degrees. Data of 6 tests are reported.

6248
CSO: 4009

AUTHOR: QIAN Yunlong [6929 0061 7893]

ORG: Shanghai Institute of Nuclear Research, Chinese Academy of Sciences

TITLE: "The Developments of Cyclotrons and Their Applications in Nuclear Medicine"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 2, 1980 pp 1-12

TEXT OF ENGLISH ABSTRACT: The developments of cyclotrons are outlined. The principle and characteristics of AVF cyclotrons are described. The requirements and possibility for production of short-lived, neutron-deficient radionuclides, for fast neutron therapy and activation analysis using cyclotrons are discussed briefly.

AUTHOR: None

ORG: Nuclear Reaction Group, Institute of Atomic Energy, Chinese Academy of Sciences*

TITLE: "The Determination of Boron Content Diffused in Silicon by Prompt Nuclear Reaction Analysis Method"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 2, 1980 pp 13-17

TEXT OF ENGLISH ABSTRACT: The concentration and distribution of boron diffused in four groups of high purity silicon samples, which were manufactured under different technological conditions, were determined by $^{11}B(p,\alpha)^{8}Be^{*}$ reaction.

* Written by MA Xinpei [7456 9515 1014].

AUTHOR: CUI Huanhua [1508 3183 5478]
WANG Shicheng [3769 0013 2052]
HUANG Maorong [7806 2021 1369]

ORG: All of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "Registration of Protons by a Cellulose Nitrate Solid State Track Detector"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 2, 1980 pp 18-23

TEXT OF ENGLISH ABSTRACT: A method of determination of the relative sensitivities of cellulose nitrate track detector for the registration of protons is presented. By this method the optimum etching condition of the Fuji film has been found. Under this etching condition the sensitivity and the efficiency of the Fuji film for the registration of protons have been determined.

AUTHOR: WANG Wuyu [3769 2976 3768]
LIN Wenye [2651 2429 2814]
XU Shuang [1776 7175]
ZHANG Biao [1728 1753]

ORG: All of the Beijing Institute of Uranium Geology Research

TITLE: "A Portable Three-Channel Spectrometer--The Contents of Ra (U)-Th Can Be Read Directly"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 2, 1980 pp 24-28

TEXT OF ENGLISH ABSTRACT: This paper describes a portable three-channel spectrometer, by which one can read the contents of Radium (Uranium)-Thorium directly. In this instrument pulse amplitude analyzers are designed with CMOS devices. By using automatic spectral stabilization system, analogue calculation method and automatic compton stripping, the instrument has a set of features of advanced existing spectrometers. In addition, the construction of the instrument is simple, compact, the weight is light and it is easy to operate for the field survey.

AUTHOR: XU Jinlong [1776 6855 7893]
XIE Kuanzhong [6200 1401 0112]
PAN Hongjin [3382 3163 6651]
LIU Cunxiang [0491 1317 4382]

ORG: All of Shanghai Institute of Nuclear Research, Chinese Academy of Sciences

TITLE: "Major Element Analysis of Pyrogenic Rock Samples with 14 MeV Neutron"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 2, 1980 pp 38-40

TEXT OF ENGLISH ABSTRACT: This paper provides a method of rapid non-destructive determination of some major elements in igneous rocks. The method is useful for exploration of minerals. Our results agree with those of chemical analysis within experimental error.

9717
CSO: 4009

AUTHOR: YUE Zhijian [1971 1807 1017]

ORG: Chairman, China Quality Control Association

TITLE: "Report of Inspection Tour of Quality Control in Japanese Industries"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 2, Apr 80 pp 1-3

ABSTRACT: In order to gain a better understanding of Japan's Quality Month Activity and her experience in extending overall quality control, the Chinese delegation, upon the invitation of Sino-Japanese Economic Association, visited Japan from 29 Oct to 29 Nov 79 on an inspection tour of the country to study the problem of quality control in Japanese industries. Japan's Quality Month movement began in 1960, and has been held 20 times every November since then. The activities are directed by a special committee, which holds 4 meetings a year to decide the theme for that year. For 1979, it is Using Quality Control to Open the Future for Japan. The system of industrial guarantee for quality, the condition of quality control using statistical methods, education and staff training for quality control, standardization, inspection, and quality of products, civilized production, hygiene,and safety, and quality control in the development of new products are the 8 topics summarized in the paper from the observations of the delegation. This paper is an abstract of the author's official report, but has not been reviewed by him before publication.

AUTHOR: YUE Guang [2588 0342]

ORG: Reporter of the journal

TITLE: "Step By Step Progress of Quality Control in the Coal System"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 2, Apr 80 p 3

ABSTRACT: On the basis of the demand of the State's Economic Committe to extend quality control in all industries, the department in charge of quality control in the Ministry of Coal called a conference of the 6 mines and 9 plants of the coal system to meet in Beijing in the beginning of 1980. Following a discussion of the experience of test points of the previous year, future problems were studied, to produce the document of Several Opinions Concerning the Extension of Overall Quality Control in Coal Mines and Coal Washing Plants. This document is summarily reported in the paper.

AUTHOR: SHAN Wencai [7026 2429]

ORG: None

TITLE: "Use of PDCA Cycles to Resolve the Problem of Tail Bending of Steel Materials"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 2, Apr 80 pp 4-6

ABSTRACT: The quality of small steel products of Shougang Medium and Small Steel Rolling Plants had been relatively stable except for the fact that the problem of tail bending cause by asynchronism of the No 2 cutting machine and the No 16 rolling machine was much too serious. According to State's regulation the curvature must not exceed 6mm/m. Tail bending of the products of that plant reached 60-70mm/500 mm of the length of a product. Customers demanded that the bent tail should be either be straightened or cut off to result in a waste of 1,700 tons of steel per year. The party committee of the plant resolved to organize a problem-attacking group composed of 13 members. Following designs of 3 PDCA cycles and 11 on site experiments, the group was able to eliminate the problem. Diagrams are given to describe the 3 PDCA cycles, as well as photos depicting products with bent tail and the products after the adoption of the improved equipment and work procedure.

AUTHOR: None

ORG: Nanjing Second Machine Tool Plant

TITLE: "Overall Quality Control in Plants of Small Batch Production of Multiple Products"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 2, Apr 80 pp 11-12

ABSTRACT: The Nanjing Second Machine Tool Plant is a medium-sized enterprise producing machine tools for processing gears. Each year, the plant makes about 600 machine tools divided into more than 10 types. There are so many types of products and each type is produced in a small batch. The degree of automation at the plant is unavoidably low. Based upon this reality, the plant divided up the quality control project into the 4 aspects of casting, machine tooling, assembling, and scientific laboratory work to proceed with simultaneous improvement. This paper describes briefly the procedures adopted by each of the 4 aspects, the PDCA cycle proposed by workers of each aspect for final coordinated adoption, etc. Preliminary results have been obtained from this approach to quality control, but many problems still exist awaiting future efforts.

AUTHOR: MEI Luo [2734 3157]
LIU Jiansheng [0491 1696 3932]
SUN Yufeng [1327 1008 0023]
ZHAO Qingzhen [6392 3237 7201]

ORG: MEI, Chief, Bureau of Science Education, State's General Bureau of Materials; LIU, Lecturer, Xi'an College of Mining Industry; SUN, Chief, Bureau of Science Education, Ministry of Construction Materials; ZHAO, Division of Science and Technology, Guangdong Economic Committee

TITLE: "Pan-discussion on Marching Toward Management Modernization"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 1-2

ABSTRACT: This paper includes 4 short items by the 4 authors respectively on the same subject matter of modernized quality control. The first author emphasizes quality control in the process of transportation and storage of materials as the first responsibility in quality management of materials is to prevent loss and waste to guarantee the supplies reaching the users timely and in good condition. The second emphasizes quality control as a science and the need of training a large group of persons skilled in this science. The third emphasizes the need for each industry to develop quality control within its own specific realm. The fourth emphasizes the need for regular propaganda, for extending unity between quality control and economy, and for training a staff skilled in quality control techniques.

AUTHOR: None

ORG: Shanghai Harbor Fifth Loading and Unloading District

TITLE: "Large Scale of Improvement in Quality and Quantity of Harbor Loading and Unloading Work by Means of Strengthened Management"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 p 3

ABSTRACT: The major responsibility of the Fifth District is loading and unloading export and import merchandise. Cargoes to and from nearly one hundred countries pass through its docks and the quality of handling is related directly to China's reputation. The paper reports a 6-point concrete management to guarantee the safety and quality handling of the merchandise: (1) Strengthing quality education to raise ideology; (2) Strict quality inspection and insisting upon responsible correction of mistakes; (3) Clear definition of responsibilities of each post and seriously implementing the system; (4) Practicing mass monitoring of the quality of performance; (5) Reforming loading and unloading procedure to resolve problems of weak links; (6) Organizing group competition and awarding the advanced.

AUTHOR: HE Chaozong [0149 2600 1350]

ORG: None

TITLE: "Accidental Cause and Anomalous Cause of Quality Fluctuation"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Apr 80 p 4

ABSTRACT: In production practice, it is wellknown that the quality of products of the same batch is not always the same. The unevenness of quality in a batch of products or a work procedure involves a sense of distribution from a statistical point of view. Two classes of reasons can induce fluctuation (difference) in objective things and events: one is an accidental reason and the other is an anomalous reason. When the quality distribution is a mean value, i.e. the standard deviation remains fixed and unchanging, the work procedure is called in a controlled state or stable state. Otherwise, the standard deviation will show irregular changes and the work procedure is called in an anomalous state or uncontrolled state. In other words, the so-called quality control means to find ways of continuously discovering and eliminating anomalous causes of quality fluctuation so as to maintain the work procedure permanently in a controlled state for the purpose of guaranteeing a stable quality of the products.

AUTHOR: None

ORG: Copper Article QC Team, Casting Machine Shop, Shougang Casting Plant

TITLE: "A Battle for Improving Quality at the 'Three-in-One' Blast Inlet of the Blast Furnace"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 5-6

ABSTRACT: The iron refining blast furnace of Shougang Casting Plant has an import accessory, the 'three-in-one' copper inlet. Due to its complex structure, it is very difficult to make. Since its production in 1977, the quality has always been poor, and the products have always been judged to be second class. A PDCA cycle was adopted to fight a battle of quality improvement with scientific methods. The concrete history of this quality battle is described. A diagram is given to explain the PDCA cycle. Contents of quality standard and outstanding problems are discussed.

AUTHOR: YE Tiqing [0673 2748 7230]

ORG: Xi'an Chemical Reagent Plant

TITLE: "Oxalic Acid, a Quality Reagent Difficult to Come by"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 7-8

ABSTRACT: Oxalic acid is a product of Xi'an Chemical Reagent Plant. For years, due to the inferior quality of the raw materials, the product had not been qualified as a reagent. Analysis of the raw materials revealed that the calcium content was 10 times higher than third grade reagent oxalic acid, sulfate radical 40-50 times, chlorine 10 times, and lead 3-4 times greater as well. If a comparison should be made with the advanced product of the world, the calcium content would be close to 100 times higher. This paper describes all the efforts and procedures adopted to get rid of these foreign matters in the plant's products. In 1979, after the strenuous reforms the reagent grade oxalic acid of the plant was judged to be a product of superior quality by the Ministry of Chemical Industry.

AUTHOR: CHEN Zhenyuan [7115 2182 6678]

ORG: Heze District Post Office, Shandong Province

TITLE: "A Discussion of How to Learn Total Quality Control TQC"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 9-10

ABSTRACT: TQC is an advanced scientific management technique. After the practice of test-point experimentation for 2 years, it has been proven that the TQC technique can promote the management of an entire enterprise. It may, therefore, be said that implementation of TQC is a necessity, but some enterprises, especially some basic units of the post and telecommunication system,have insufficient understanding of the technique. In this paper, the author discusses whether it is a problem of the fact that as the technique originates in the West, it is a thing belonging to capitalist countries; should or should not China learn it. Or, as China's conditions are different from those of other countries, can or cannot China learn the technique? Or, is this a problem of how to learn it? Ways pointed out by Premier Zhou, according to the author's interpretation, of concretely handling the relationship between introducing and creating are explained.

AUTHOR: None

ORG: Honing QC Team, Xi'an City Internal Combustion Engine Accessories Plant

TITLE: "Correct Way of Resolving the Problem of Oval Overdifference"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 11-12

ABSTRACT: The QC team for correcting the oval overdifference of the inner hole honing process was organized to compose of 8 workers. The job of the team is the precision, smoothness, ellipticity, the taper gauge, etc. of the inner hole of the cylinder cover. This type of cylinder cover requires 10 work procedures to tool from the rough to the finished product. The inner hole has to be honed twice. The machine shop was made into a TQC test point in Jun 79, and the team was assigned the topic of resolving the problem of oval overdifference. This paper describes the various steps taken by the team from searching for the cause of the problem, to looking for methods of correcting it, to the adoption of several PDCA cycles, to the final successful resolution of the problem.

AUTHOR: LING Wenquan [0407 2429 6530]

ORG: Institute of Psychology, Chinese Academy of Sciences

TITLE: "Efficiency Theory and Quality Analysis"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 13-14

ABSTRACT: In order to develop quality control, reasons influencing quality, i.e. causes of producing waste and inferior products, must first be found so that measures aimed at resolving the problems may be implemented. Ordinarily, analysis of problems for quality control at mines and industries is mostly done with methods of mathematical statistics to locate the cause from raw materials, machines, work procedures, etc., while the human factor is often neglected or overlooked. In reality, human being is a relatively important factor influencing quality of products. Analysis of quality of products from the human factor point of view requires the technique called work efficiency. This paper explains the method of using statistical analysis, classification of waste and inferior products, and a phychological analysis of the human factor in producing waste and inferior products. Such analyses in a certain factoryare given to illustrate the technique.

AUTHOR: NAN Jiang [0589 3068]

ORG: None

TITLE: "Quality Control in Cement Products Factory"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 pp 15-18

ABSTRACT: Shuize [transliteration] Factory is a plant in Japan producing concrete products for paving roads. This paper reports the organization structure of the plant, its condition of quality control, raw materials management, control of the manufacturing procedures, management of the equipment, and quality guarantee of products. The paper consists of data translated and compiled by the author from information provided by the Japanese factory.

AUTHOR: None

ORG: Shougang Technology Division

TITLE: "Progress in Quality Control Education in Shougang"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4, Aug 80 p 32

ABSTRACT: For TQC, the Shougang Steel Mill started from education. Since Apr 79, the company has organized 39 training courses in various types of QC education, as well as 16 lectures and report meetings to teach all of the 1500 cadres of the company, as well as 90 percent of the company's secondary personnel and close to 100 technicians. Furthermore, the company also trained close to 200 teachers for the Beijing Municipal Economic Committee and the National Metallurgical System. The major experience of the QC education projects developed at Shougang is summarized in the paper.

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No. 63

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CHINA REPORT

SCIENCE AND TECHNOLOGY

No. 63

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NATIONAL DEVELOPMENTS

BRIEFS

TELECOMMUNICATIONS IMPROVEMENTS--The Ministry of Posts and Telecommunications recently held a telephone conference, calling for efforts to improve quality in the field of telecommunications, combat corruption and theft, and insure safety in operation. Cheng Anyu, vice minister of posts and telecommunications, spoke at the conference, urging all units concerned to improve telecommunications and expedite mail delivery. [OW281707 Beijing Domestic Service in Mandarin 0400 GMT 28 Sep 80 OW]

CSO: 4008

HIGH ENERGY EXPERIMENTS SEEN AS KEY TO DEVELOPING HIGH ENERGY PHYSICS

Beijing ZIRAN BIANZHENGFA TONGXUN [NEWSLETTER OF DIALECTICS OF NATURE] in Chinese No 3 Jul 79 pp 67-77

[Article by Wang Zhuxiang [3769 4376 5046]: "The Function of High Energy Experiments in the Development of High Energy Physics"]

[Excerpts] High energy physics is a science that studies the properties of basic particles, their inner structure, and the patterns of mutual reaction and conversion. At present, high energy physics has already developed greatly. In the development of high energy physics, experimentation has always played the leading role. This article is aimed at emphasizing several major problems in the development of high energy physics to explain the dependent relationship between theory and experimentation and the leading role played by experimentation. It also points out the importance of high energy experimental physics and the difficulties and complexity of modern day high energy experiments. Finally it proposes some views on how to prepare for high energy experiments and future prospects.

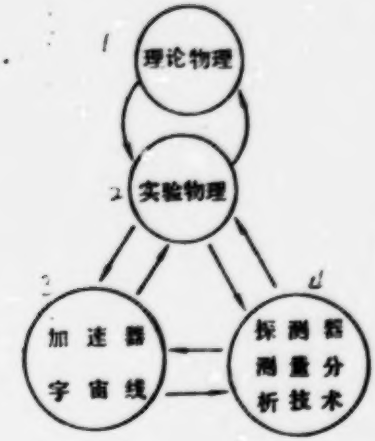
Experimental Achievements Are the Signposts of Advanced Levels

We can conclude here that high energy experiments always play the leading role in the development of high energy physics and are a decisive function. They are the most active and the richest in creativity in the entire field of high energy physics. They are the central link in the development of high energy physics. If a nation's experiments in high energy physics take the lead internationally, then its theory will also be in the leading position, and thus the entire field of high energy physics will be in the lead. Conversely, if its experiments are backward, then its theory will not be advanced and even if it can build very good accelerators, the entire field of high energy physics will still be backward.

In connection with this point, let us take a look at the relationship among theoretical physics, experimental physics, accelerators and probes (including data analysis and processing equipment). Comrade Peng Huanwu [1756 ˙˙19 2976] once explained the relationship among the four aspects above by drawing a symbolic illustration. He believes that experimental physics is the heart of the entire field of high energy physics. He points out that to engage in experimental physics, one cannot be without an accelerator and a probe and one cannot be without the guidance of theoretical physics. But experimental physics is the center of these four aspects. This viewpoint is correct because theory without experimentation as foundation will have no basis and will not develop. In the same way, even if one has an accelerator but the probe is not as advanced and experiments cannot be carried out or even if one has an accelerator and a probe but because the preparation for experiments is not done well and good experiments cannot be carried out, then all of these will render the building of an accelerator ineffective.

Therefore, in the development of high energy physics, experimental physics is situated at a key position. It is very important and can never be neglected even slightly. It should be especially noted that high quality achievements in experimental physics and the presence of high caliber talent conducting these experiments are the true signposts that indicate the internationally advanced levels have been reached.

Here, we will present one example as contrast and for explanation. In 1960, the Brookhaven National Laboratory (BNL) of the United States built a 33GeV proton accelerator. For more than 10 years, attention by the leadership and joint efforts by experimental physicists and technical personnel enabled high quality probing facilities and scientific and technical personnel to be prepared early. Very outstanding achievements in physics were realized in this accelerator and great and important contributions were made to the development of high energy physics. For example, massive discovery of resonance states; proof of the existence of the second category neutrino; discovery of the Ω^- particle; discovery of nonconservation of CP during the decay of K_L° and the discovery of the J particle and such experiments can all be said to be key developments in physics. These achievements brought praise from the international scientific circles to BNL. It is believed that their level of achievement is the highest in the world. Conversely, the Soviet Union built a 10GeV proton accelerator in 1957. Except for the discovery of the $\tilde{\Sigma}^-$ antihyperon by our nation's Wang Ganchang [3769 3227 2490] group, there has not been other outstanding work in physics. In 1967, the Soviet Union again built a 76GeV proton accelerator. At the time, this was the world's largest accelerator but because advanced probing techniques were not grasped beforehand and experimental physicists were not prepared, important achievements were not realized for a long time in physics. Internationally it is unanimously believed that the Soviet Union is far behind the West in high energy physics. The above examples fully show that although the accelerator is a kind of tool that is indispensable in high energy experiments, but by itself it cannot represent the level of high energy experimentation. If a high energy experimental base realizes remarkable achievements and has reached the internationally advanced levels, then this mainly refers to the achievements in experimental physics. Yet this is indeed more difficult than building an accelerator and a more difficult task.



Key:
1. Theoretical physics
2. Experimental physics
3. Accelerator
   Cosmic rays
4. Probe
   Measurement and analysis techniques

The relationship among theory, experimentation, accelerator and probe

Preparation of the Work in Experimental Physics

Building a modern high energy accelerator of course is not an easy task. It is indeed very difficult and it should be forcefully grasped first. But, preparation of the work in experimental physics is also a very difficult task. According to the experience of high caliber laboratories abroad, the overall task of building various high quality and effective probes and measuring facilities and building an entire experimentation zone are even more difficult than building an accelerator. This is because they are varied and their scope is wide, their technology is more complex than the accelerator, the overall scale is larger than the accelerator, the overall cost surpasses the cost of building an accelerator, the building period is about the same as that of building an accelerator. Therefore, unified planning of a high energy experimental base must give sufficient attention to preparatory work in experimental physics and must be grasped immediately. Otherwise, experimental work will be delayed.

At present, how should preparatory work for experimentation and the probe be carried out? There are two views. One view believes that to begin experimentation 5 years from now, concrete subjects in physics must be selected now and then the various types of instruments and facilities are prepared according to the needs of the subjects. Preparation should be completed within 5 years and then experimentation can begin. Another view believes that if subjects in physics are chosen immediately, there will be great difficulties. This is because nobody has any practical experience and which questions are the most important cannot be envisioned. Even if the topics are chosen, it is very possible that they will have to be changed 5 years from now. If we wait until we can envision the right problems and after the subjects in physics are determined and then make preparations for the probe, then time will have already passed and by that time there will not be enough time to prepare the instruments. Because we do not have readily available probes and basic instruments, everything has to be developed by research, and the period for developing and building most of the equipment and facilities is at least 4 to 5 years; thus, it has been advocated that the subjects of study in physics should be neglected and probing facilities should be built first.

I believe both of the above views are right but they are not comprehensive. According to the ordinary situation of foreign laboratories, generally the topics in physics to be studied have indeed been established first and have been approved by the academic leadership of that institute before preparation for laboratory facilities begins, except for the general purpose probes such as the hydrogen bubble chamber, the multiple particle spectroscope, etc. This is very easily accomplished by laboratories which have massive numbers of ordinary equipment, massive numbers of basic installations and massive numbers of probes. This is because not too much time has to be spent on determing the subject, proposing the problem and preparing for the experiment. All these can be done in half a year or at most 1 or 2 years. Most of the instruments are readily available. If they are not enough, they can be bought on the market immediately. Therefore the topics to be studied will not be outdated. But if the time between making the proposal of the topics for study and the actual time the experiment begins is too long, such as 4 or 5 years, then obviously the problem as to whether the selected topic is out-dated or not will emerge. On the other hand, if probing facilities are prepared first without regard to the topics in physics, then what kinds of probes and equipment should be developed, nobody would know. Therefore, considering our actual situation, I believe there should first be a general direction in the study of physics, and then preparations of basic and general purpose probes and facilities should start immediately. These probes and facilities are necessary for a high energy laboratory and are also those which will be needed by a majority of experiments, for example, the multiple streak proportion chamber, drift chamber, Cherenkov counter, flash counter, electronics instruments, general purpose magnet, hydrogen bubble chamber, time chamber,...etc. As the basic facilities and equipment are being developed, the subject of study in physics should be clarified gradually. After 1 or 2 years, our probing technique will have established a relatively solid foundation, and at the same time our ideas in physics will gradually become active. By that time, concrete topics of study can be determined, and experimental facilities and probes can be selected according to the topics.

Prospects of High Energy Experimental Physics

Since the birth of high energy physics, high energy experiments have already realized great achievements, and many important problems have been solved. Yet, man's understanding of nature is never complete, and as man's understanding deepens, there will be a lot of new questions that will be proposed and which will require experimentation to solve. Seen at the present time, the following problems urgently need to be solved.

1. Finding Quarks (or Stratons)

Since the quark model can better explain particle classification and certain patterns in strong action, weak action and electromagnetic action, predicting their existence is very rational. Therefore the search for quarks will be an important topic in future experiments. The search for quarks must be to find them singly and to measure their properties such as mass, charge and life. The major difficulty in searching for quarks is that their mass is large and the accelerators in the world at present still cannot separate them from protons. Experiments to search for quarks are not limited to the use of accelerators. Quarks can be found in cosmic rays or samples of earth's substances. But to find them, methods of much higher sensitivity must be used.

2. Finding new fundamental mutual reactions such as super-strong actions and extra-weak actions.

3. Finding the intermediate bosson W. One theory predicts that its mass is greater than 37GeV, another theory believes it is even greater.

4. Continuing the search for the heavy lepton, studying the spectrum of the lepton and its properties, exploring the internal structure of lepton itself and the relationship between leptons and intermediate bossons--transmitter of weak actions.

5. Conducting experiment with the neutrino by using high energy neutrino bundles to explore the inner structure of neutrons and even the structure of the lepton.

6. Finding other new particles, such as the chi-graviton, heavy photons, gluons, magnetic monopole particles and even heavier unknown families of particles.

7. Examining the applicability of quantum electrodynamics in even smaller areas (smaller than 10^{-16} centimeters). Whether these particles have any dimensions is related to their structure. These experiments require an electron-positron smasher of even higher energy.

According to past development, we can predict that in the coming 20 years, more new phenomena which we cannot foresee at present will emerge; therefore they will greatly enrich the content of high energy physics.

It must be emphasized and pointed out that to enable high energy physics to continue to develop, accelerators of even higher energy and probing techniques and experimental methods that are more sensitive and more effective are needed. Like the problems mentioned above, most of them cannot be solved by the presently available high energy accelerators. Therefore, the world's nations are now building and preparing to build accelerators of even higher energy. Positive and negative electron smashers scheduled for completion this year or next year are: West Germany's PETRA of an energy of ~2 x 20GeV and PEP of the United States with an energy of ~2 x 20GeV. They will contribute towards quantum electrodynamics within even smaller areas, the examination of the unified theory of electromagnetic forces and the weak force, and the search for particles of even greater mass. Recently the United States government approved the Brockhaven National Laboratory's ISABELL plan to build a 2 x 400 GeV proton smasher scheduled for completion in 1985. It can be expected that as this smasher-accelerator is completed, a majority of the questions mentioned above can be solved by experiments.

What kind of probes should we use to probe cases of reactions of such high energy particles? The presently available probing technique cannot measure the properties of particles of very high energy because these probes cannot differentiate the speed and ionization of high energy particles and also they cannot accurately measure momentum. Multiply produced actions simply cannot be measured. Therefore, after the 2 x 400 GeV proton smasher of the United States is built, although the search for straton and intermediate bossons is very hopeful, but during the experiment, a very difficult problem of an extremely large background will be encountered. How can the background be eliminated? Or, how can the probe be desensitized to the background and be sensitive only to those cases which are of interest? All of these are problems that have to be solved. It can thus be seen that as the energy of the accelerator increases, there must be corresponding improvements and development in probing techniques and experimental methods and even a new type of probe may have to be created. This point should definitely not be neglected, otherwise good experimental results cannot be obtained. It can be ebelieved that as high energy experiments make their demands, this type of probing technique and experimental method will definitely emerge.

Looking back at the past development and looking at the future, we are full of confidence in the future of high energy physics. Construction for preliminary development and research of our nation's first high energy accelerator has already broken ground in Beijing. This signifies that our nation's high energy physics research has begun a new phase. This modern scientific construction project is large, its technology is complex, and its facilities are refined and good. Its completion will promote the development of our nation's new materials, new technology and new techniques, the elevation of the standards of industry, provide a forceful means for basic research and applied research, and train many scientific and technological talent. We believe the development of our nation's high energy physics will contribute greatly towards our nation's realization of the four modernizations and especially towards the realization of the modernization of science and technology.

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CSO: 4008

TECHNIQUE OF USING OXYACETYLENE FLAME TO CUT CONCRETE DESCRIBED

Beijing GUANGMING RIBAO in Chinese 10 Sep 80 p 1

[Article: "Gas Welder Li Benmao With Only Elementary School Education Sucessfully Develops a New Technique Using Gas Welding to Cut and Low Temperature Flame to Bond Concrete"]

[Text] GUANGMING RIBAO reporter Dong Kegong [5516 0344 1872] and AN GANG BAO reporter Wang Zhongfang [3769 1813 5364] report: Gas welder Li Benmao [2621 2609 5399] of the civilian buildings company of the Anshan Steel Mill successfully developed the new technique and new technology of using oxyacetylene flame to cut concrete and using low temperature flame to preheat and bond concrete in February of last year and in August of this year respectively.

Li Benmao only had an elementary school education. Beginning on the day in 1958 when he joined the plant, he studied hard and delved deeply into technology. Gradually he grasped the skill of cutting and welding many kinds of metals. At the same time, he compiled a draft for a book of 150,000 words entitled "Fundamentals of Gas Welding" based on over 20 years of practical experience.

The use of oxyacetylene flame to cut steel and iron had already been popularized in production a long time ago. But to use it to cut concrete was not an easy task. Li Benmao saw that when workers installed water pipes, gas pipes and heating pipes, they had to use drills to drill holes in concrete slabs. This required a lot of work and a lot of strength and it was not safe. He thought: can a gas welding torch be used to burn a hole in concrete? When he told the technicians and leadership personnel about his idea, he immediately received their support.

The key to using gas welding flame to cut concrete is to solve the problem of explosion of the concrete. To overcome this difficulty, Li Benmao conducted over 200 experiments. One day, as he was cleaning the mouth piece of the cutting torch, several drops of sulfuric acid dropped onto the concrete and a chemical reaction immediately occurred. He aimed his welding gun at the place where the sulfuric acid had eroded away the concrete. No explosions occurred and the concrete melted. That afternoon, with the help of the foreman and the work instructor, he spent over 2 hours the first time to burn a hole 100 millimeters in diameter through a concrete wall 270 millimeters thick. Later, Li Benmao received help from the chemistry teacher of the health school and technicians of his own unit to make three kinds of more ideal chemical agents to radiate heat and to prevent explosions. The body of the cutting torch was also reformed, and a new type of cutting mouth piece and acetylene generator were designed. Thus this new technique was continuously improved and perfected. Concerned departments tested the devices and determined that they produced remarkable results in cutting holes of various diameters in concrete structural components under 300 millimeters thick with oxyacetylene flame. Only 20 minutes were required to burn a hole 80 millimeters in diameter through a concrete wall 140 millimeters thick. The work efficiency was 8 times higher than manual labor, and the cost was only 42 cents. The strength of the concrete 20 millimeters away from the hole was not affected.

This new technique of using oxyacetylene flame to cut concrete has a very high practical value in the construction industry, therefore it has received widespread attention. Up to the present, over 3000 people have become students of Li Benmao and have grasped this new technique. This new technique not only received widespread popularization and use throughout the nation but new rennovations have been ceaseless. At Anshan Steel Mill alone, such technologies of using oxygen flame for cutting, electrical welding torch for cutting and electric arc cutting have emerged. The scope of materials being cut also gradually expanded to include heat resistant bricks, red bricks, bricks made of mineral dregs, granite, ferrous rock and procelain, altogether over 10 kinds of nonferrous construction materials.

Li Benmao did not stop after achieving success in successfully developing this new technique. In April of this year, he also began to study bonding and welding of concrete. In a period of over 3 months, he read over ten books related to the subject and many materials. He utilized holidays three times to go to the mountain regions over 100 li away to learn the skills of old stone cutters among the people. With the help of comrades and after 29 repeated experiments, he successfully developed in early August the new technique of using low temperature flames to preheat and bond concrete. Testing and evaluation showed that under a load of 1500 kilograms, a seam in a prefabricated slab of concrete bonded by this new technique will not change or break in any way. In a test of strength of a test sample made of bonded materials and placed under a 60-ton press, the strength of resistance to pressure per square centimeter was 245 kilograms. This new technique has the advantages of being economical, practical and easily popularized. It can also help the state conserve massive amounts of cement, steel and such construction materials.

To give recognition to the achievements of Li Benmao, the Anshan Steel Company and the people's government of Anshan City promoted him to technician and gave him a two-level raise in wages, and bestowed upon him the honorary titles of model laborer of Anshan Steel Company and model laborer of the city.

9296
CSO: 4008

APPLIED SCIENCES

DEVELOPMENT OF SYSTEMS OF STRUCTURES OF INDUSTRIAL BUILDINGS

Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese
Vol 1 No 3, 5 Aug 80 pp 49-54

[Article by Chen Minsan [7115 3046 0005] of the General Institute of Design of the First Ministry of Machine Building: "On the Development of the Systems of Structures of Industrial Buildings"]

[Text] (Abstract) This article is an introduction to the development of the systems of structures of industrial buildings in our nation and points out some problems in the development of systems of structures of industrial buildings which need to be solved and some methods of solving them. It also describes the trend in the development of modern industrial buildings.

Industrial architecture is an important part of architecture. Hastening the development of the system of structures for industrial buildings not only has an important significance in the industrialization and the modernization of architecture but also has a definite significance in hastening the basic construction of industry and business.

I. The Development of the Systems of Structures of Industrial Buildings

Since the founding of the nation, our country's level of technology, design, construction and installation in the science of structures of industrial buildings has risen greatly and great achievements have been made. The first five-year plan began large scale industrial construction. The style of the structure of industrial buildings during this period was characterized by boards, supports, pillars and brick walls. Sturdy factory buildings were mainly built with steel structures. Medium and light factory buildings were mainly built with cement. In the making of structural components and on-site construction, small components were mostly prefabricated in factories and large components were mostly built on site. Mechanized means were mostly used to lift and install the components in place. Therefore, basically the design, manufacture of components and installation constituted a set of operations, forming a kind of system of industrial building. Because of the limitations of building materials, heavy materials were used for roofs and peripheral structures, such as large boards for housing and brick walls. As to the usefulness of these structures, this kind of system of architectural structures is safe and reliable and can satisfy the demands of production. Its shortcoming is that the building structure has a heavy dead weight, it uses a lot of materials and labor, and in its course of development, this system was used without any regional differentiation and regardless of weather conditions. This was obviously not a system that was suitable overall. Through the first 5-year plan, this kind of system of building structures established a foundation throughout all regions of the nation. Therefore, during a very long period afterwards, industrial building also adapted this system of building.

After the revolutionary movement in design, a new system of building structures emerged, for example, prefabricated folded plates, double T boards, saddle shaped shell boards, tubings, door type steel frames, and raised board structures. These structural systems were basically good in practical application.

Beginning from 1974, the State Capital Construction Commission campaigned for the development of a system of structures for industrial buildings to hasten the development of industrialization of architecture. Changzhou, Wuxi and Taizhou areas were regions where the work in systems of structures of industrial building developed relatively early in our nation. In 1975, the State Capital Construction Commission's former architectural science research institute held a panel discussion on the systems of industrial buildings. Topics discussed included how standardization of single structural components should develop into systematized architectural structures for entire factory buildings. This question concerning the system of structures of industrial buildings began to be noticed by people. To hasten the development of the system of structures of industrial buildings, the Committee on structures of the Chinese Architectural Society will hold an academic discussion meeting on the system of structures of industrial buildings this year. We recently went to several concerned localities and gained some understanding of the systems of structures of industrial buildings. Our observations are briefly described below:

(1) The System of Structures of Industrial Buildings of a Single Story in Changzhou

This system uses boards, supports, pillars and wall boards for the form of the buildings structure. It is an improved version based on the traditional system of building structures. The following work was done:

1. The degree of standardization of the design was raised. A general purpose design was drawn up. It can be used to assemble 322 shops of a definite type.

2. Structural components were mass produced in factories. They started out by taking the city as a whole in their unified planning. Old enterprises were assigned different tasks according to specialization and

rational distribution principles, gradually forming a system for the building industry in which the frontline and the supporting factories at the rear produce materials that compose a set.

3. The structural components are fixed and modular in form and in dimensions.

4. Construction was mechanized. Large and medium sized machinery was equipped as key facilities and for centralized use. Machinery groups were coordinated as sets and used to install, lift, transport and dig and move earth for large size structural components in construction projects throughout the city.

Testing of the system of structures of industrial buildings of a single story in Changzhou resulted in a rise in the rate of productive labor and a lowering of the amount of consumption of materials.

(2) The System of Structures Built With Reinforced Concrete

This system belongs to the system using boards, supports and pillars in architectural structure but the structural components of various types of structures are put together by concrete tubings produced by the centrifugal method. Examples are supports and pillars for houses. The system of tube structures has been widely popularized in the Sichuan area and is also frequently used in Hubei and Anhui.

The structural components of the tube structures are formed by pouring by the centrifugal method. They are strong and are of good quality and the factories produce them in batches. The efficiency of production is high. This coincides with the direction towards industrialization. The structures built with these components are light and have beautiful appearances. But production of the tubes requires a set of facilities and installation of some components such as supports for houses requires more work.

(3) The System of Structures of Door Type Frames

This system is a form of architectural structure combining the beam and the pillar. The beam and the pillar are joined as a whole by hard joints. This system had already been used during the beginning period of the 1950's in Shanghai. After the 1960's, this system of door type steel frame structures was used in Taizhou in northern Jiangsu to build over 40 factory buildings. They constitute a single and independent system.

(4) System of Folded Plate Structures

Many localities in the country have used folded plates for roofs. According to incomplete statistics, there are already close to 1 million square meters of industrial and civilian buildings that have used this type of structure. Folded plates are generally produced by assembly lines. They are relatively easy to manufacture, their dead weight is relatively light, and their economic characteristics are better. A completed structure using folded plates is a spatial structure. Its degree of hardness is high and its resistance to quakes is good. The problem of light and ventilation in structures of folded plates is not easy to solve and they are better suited for single span structures. But their heat retention and insulation are poor and appropriate measures should be taken during their design.

Folded plates can be used not only for roof structures but can also be used as verticle weight bearing wall panels. This type of structure using only folded plates was built in Fuzhou on an experimental basis and the results have been relatively good.

(5) The System of Double T Boards

As a form of architectural structure, this is a kind of combined structure of boards and supports. This type of structure had been used in our nation during the 1960's but it was not popularized. This type of boards can be used as surface boards for houses as well as for floor boards and the varieties are few. It is suited for the needs of various widths of span and various loads. This type of boards can be produced on an assembly line and it is easy to manufacture. But the boards are heavy and when the width of the span is greater than 12 meters, it is more difficult to lift and transport the boards. This affects the popularization of this type of structures.

The double T boards can be used for roof structures and also for weight bearing outer wall boards. They can form a structural system using only double T boards. This system has been tested in Wuhan. This system is better suited for constructing small factory buildings that are not too tall.

(6) The System of Structures of Saddle Shaped Shell Boards as Roofs

Saddle type shell boards are a structure combining boards and supports. They have been tested in the Hangzhou area beginning in 1972 and at present many buildings in the Zhejiang area have used this type of structure.

Saddle shaped shell boards as roofs have few varieties of components and lifting and installation are fast. Saddle shaped shell boards have a curvature in two directions and their manufacture is more complex. A definite experience is required. When the width of the span is greater than 12 meters, it is more difficult to lift, install and transport saddle shaped shell boards.

(7) The System of Structures of Raised Boards

This type of system actually is a kind of board and pillar structure. The pillar is prefabricated in whole at the site. The board is placed flat on the ground layer after layer and cast. After they have been installed in place, an electrically operated lift is used to lift each layer of boards to a predetermined height. Then an instantly poured cap or sheer block or a weight bearing pin is used to affix the board on the pillar. This type of structure can be used to build multiple layer factory buildings, warehouses and laboratories. Construction of this type of structure requires less working space, the amount of work which has to be done at high levels is reduced and the height of the structure is reduced but the amount of steel required is large.

(8) The System of Structures of Multiple Layer Frames and Supports

The pillars can be prefabricated or instantly poured. The beams are generally prefabricated beams like the handles of flower baskets. On the sides of the beams are legs to support the floor boards. The boards are usually prefabricated trough boards. After they are installed, another layer is instantly poured so that the board and the beam become one whole unit. This type of system is being used more in building multiple layer factory buildings at present and the results are better.

In addition to some of the systems mentioned above, there are also the system of network and support structures and shall structures for roofs in building single story industrial factory buildings. These are scarcely used in our nation and they will not be described.

II. What Are the Problems That Need To Be Solved in Developing the System of Industrial Buildings?

Although the system of industrial buildings have already been tested at some localities, there are some prerequisite problems that have not been solved satisfactorily. These prerequisite problems cannot be solved by one locality or one unit. Therefore, it is very important that the committee on structures of the Chinese Architectural Society organize a meeting to exchange and discuss the experience and the problems in developing the system of industrial buildings.

(1) The Problem of General Design and Standardization

The development of a system of industrial buildings involves each of the aspects of design, materials, production of structural components, construction and installation. Of these, design is the foremost and primary aspect. The problem of generalized design and standardization must be solved well before production can be industrialized. At present, the reasons that the systems of industrial buildings cannot be unified are: First, because the nature of production of each profession is different, the demands for industrial buildings are also different. This is why there are various kinds of different industrial buildings. The function of the buildings are different, therefore there are different forms of buildings. For example, there are single story industrial buildings and multiple story industrial buildings. Single story industrial buildings also include tall, large and heavy buildings and medium, small and light buildings. This means that many types of systems of structures of industrial buildings are needed to adapt to the needs of different professions. Second, because of our nation's economic system, there are the various design institutes of the central offices and there are also regional design institutes. Projects of the various departments of the central government are designed by the design institutes of the departments of the central government. Regional projects are designed by regional design institutes. Each has its own traditional ways of doing things, therefore some can be unified while others cannot. For example, the standard designs for structural components include the "state standards" and also the "departmental standards," the "provincial standards," and some large design institutes also have their "institute standards," thus the kinds of standards for structural components are many. In the construction and production of a region, there are projects designed by the locality, and there are also projects designed by the various departments of the central government, thus standard structural components cannot be standardized.

The first reason described above is objective but it is not true that the buildings of different professions have no common points. The common things must be found among the different things. The second reason is subjective. As long as there is an agency that will be responsible for carrying out the work, unification can be realized.

Should a generalized system be set up or should specialized systems be set up? We believe that under the present conditions in our nation, the major system should be a generalized system and where conditions permit, specialized systems can also be set up. The generalized system involves different combinations of a whole set of standard structural components and general purpose parts to form buildings of different parameters to satisfy different demands. The structural components of this kind of a system are standard but they can be put together to make buildings of different parameters. This possesses a definite versatility. Specialized systems not only have standard structural components but the parameters of the buildings are also fixed. These types of systems have fewer varieties of standard structural components than a generalized system, but lack versatility.

Should a generalized system usable throughout the nation be set up? At present, building systems are all based on the locality as the unit. The systems are modified according to the principle of specialization and distribution of labor by the processing plants and construction teams of the area to adapt to the needs for industrialized production. This way is correct from the regional point of view. But if a region has projects designed by the region and also projects designed by the various departments of the central government, the system of buildings specified by the locality will not necessarily satisfy the needs of the design institutes of the various departments of the central government. Therefore, a second system is needed to satisfy the different needs.

From the point of view of the design institutes of the various departments of the central government, their design projects are scattered at various localities throughout the nation, and it is hoped that there is a generalized system to adapt to the needs of the various localities. If there are only regional systems and there is no generalized system usable throughout the nation, their work will be very difficult. The only way is to have both a regional system of building and a generalized building system usable throughout the nation. When the regional system can be used it should be used and when the regional system cannot be used then the nationally usable system should be used. In this way, most of the medium and small factory buildings can use the regional system and the few tall factory buildings can use the nationally usable system. If the regional system can coincide with the nationally usable system, then the work would be even simpler.

(2) Setting Up a Unified Building Parameter and a Fixed Type of Shops

To launch the work in setting up a system for industrial buildings, each profession must be taken as a unit first to establish the parameters and the fixed shop designs for industrial buildings of each profession. The department in charge of the profession should be responsible for setting up the system. According to the present system in our nation, factories of one type of profession may not be under the ministry of one industry. For example, the factories of the machinery industry are under the First Ministry of Machine Building but also under the ministries of other machinery industry and the agricultural machinery ministry. Other ministries also have machinery factories (such as the machinery repair plants of the ministry of metallurgy, chemical industry equipment manufacturing plants of the ministry of chemical engineering, the locomotive and car manufacturing plants of the railroad ministry, textile machinery manufacturing plants of the textile ministry, engineering machinery manufacturing plants of the State Capital Construction Commission, etc) that all belong to the machinery industry. The First Ministry of Machine Building can act as the central organ to coordinate other related ministries to set up unified parameters and a fixed design for shops.

Secondly, because there are commonalities between one profession and the other professions, the commonalities can be unified. First, the building parameters and a fixed design for shops can be established uniformly for similar professions and be expanded gradually to other professions. The work involving the unification of standard designs for structural components has already been carried out by the institute of standards of the Chinese Architectural Science Institute for a relatively long period. Many national standard designs for structural components have been organized and compiled. The structural components themselves are basically applicable, safe and economical. But more improvements are needed in the entire structure and in reducing the types of structural components and establishing fixed modular boards. Many standardized structural components lack interchangeability. If one structural component is replaced by another type of structural component, then most of the blueprints will have to be revised.

This causes a lot of trouble in design and construction. We believe standard structural components must possess a definite interchangeability. The same type of standard structural components should have a unified dimension themselves and the joints between component parts must also be standardized.

(3) Selecting Suitable System of Building Structures

Evaluation of a system of building structures must take into consideration such aspects as range of adaptability, building speed, consumption of materials, rate of productive labor and construction costs. Therefore, a better system of building structures should have a wide range of applicability, a fast construction speed, consume less materials, have a high rate of productive labor, and a low construction cost. To realize these demands, first, the buildings must possess a definite versatility to adapt to the needs of many professions; second, the design must be generalized, the shapes must be fixed to reduce the varieties of structural components; third, manufacture of structural components must be simple to adapt to the requirements of mass production in factories; fourth, the transportation, and the lifting and installation equipment of the structural components must be easily solved; fifth, the dead weight of the building must be light to reduce the amount of materials used.

Selecting regional systems should be based on actual regional conditions. A building system must suit the locality and the local conditions such as the nature of the profession, the supply of materials, the construction capabilities and the available machinery and equipment. The building systems presently being developed in our nation by some industries all have definite advantages and ranges of adaptability and they can be used as regional systems. For example, in the Sichuan area there is a cement tubing plant that has definite experience in tube structures and thus tube structures can be developed. Again for example, in the Hangzhou area there is a definite experience in saddle shaped shell board structures and thus the saddle shaped shell board structures can be developed. Generally, measures must be suited to local circumstances, and local conditions must be used as the basis for selecting a system that is suitable for the locality.

In selecting a system that is generally applicable throughout the nation, special attention must be paid to a wide range of applicability and easy acceptability at all localities. In view of the present situation, only the traditional system of structures of industrial buildings, i.e., the system using boards, supports, pillars and wall boards can be used as a nationally applicable system. Because the range of applicability of this system is wide, it is applicable for building different types of shops of many different professions. Secondly, this system already has a certain foundation in all places throughout the nation and it is easily accepted by everyone. Although the structural system combining the board and the support has such advantages as having only a few types of structural components, but when used for multiple span buildings, light and ventilation problems cannot be easily solved. When the span is large, there are definite difficulties in transportation and installation. Therefore, in view of the present situation, this type of structural system can be used as a regional system but it is not suitable as a nationally applicable system.

III. The Trend of Development of Modern Industrial Buildings

The trend of the development of modern industrial buildings is definitely related to the system of structures of industrial buildings. It is an important question that must be taken into consideration in developing a system of structures for industrial buildings.

(1) Modern industrial buildings not only require that industrial architecture itself must reach a modern level, more importantly, industrial architecture must be able to adapt to the demands of modern technological production. The purpose of industrial architecture is to provide facilities and equipment and sites for production lines for technological production and to provide support for conveying machinery within the shops and a good working environment. Because science and technology develop ceaselessly, because products continually renew themselves, the technology of the flow of production, facilities and equipment must be correspondingly adjusted. Modern industrial architecture must also adapt to the needs of such adjustments. Therefore, industrial architecture must satisfy the demands of present technological production in design and also must take into consideration a certain versatility to adapt to the needs of future development and changes in production.

Secondly, construction of a large plant frequently is not completed in one effort but is planned before hand and constructed in phases. Therefore, during the design of the plant, the overall plan must include space for expansion. The architectural structure must take into consideration the possibility of expansion so that the development of the plant can be versatile. The following aspects should be included:

1. Expand the pillar network of the building structure or use a square network of pillars.

The distance between pillars can be expanded from 6 meters to 12 meters or larger. This will provide the plans for the facilities with more versatility and make it easier for future adjustment. Batch produced production shops can use a 12 x 12, 18 x 18, 24 x 24 square network of pillars. These are not only beneficial to planning of the facilities but also production lines can be planned on both sides. Therefore, the planer form of this type of factory buildings tends to be rectangular.

2. The ground surface of the shops must have a definite hardness to facilitate placing of several lathes directly on the surface without having to build a foundation. Electrical wiring and ventilation facilities should be installed inside the spaces of the frames of the buildings as much as

possible. Joints of the frames should be designed for possible handing of pulleys and suspension chains. Shops equipped with bridge type pulleys should consider the possibility of elevating the pulleys.

4. Partitions inside the shop should be made of light weight materials to facilitate removal. Outer walls that will have to be expanded should not be built with permanent structures, and the body of the wall must be built with light weight materials or assembled wall boards should be used to facilitate removal. Tubing outside the building should be planned in such a way that it will not have to be moved as much as possible during future expansion.

5. The height of the factory building should satisfy the demands of installation and utilization of the tallest equipment. The net space on top of the bridge type pulley should be appropriate.

(2) The second trend in modernized industrial building is the use of joint factory buildings. Production work and departments of different nature are set up inside one factory building of a large area, such as setting up metallurgical work, punching, welding, heat treatment, assembly, painting and warehousing all inside one factory building. Light partitions and passage ways are used to separate them. The advantage of large area joint factory buildings is that planning is compact, the distances for technological flow and materials transport are short, tubing and wiring distances are short, the outside surface area of the building is small, consumption of heat is less and less space is required. In addition, large area joint factory buildings are a necessary means to realize versatility. Without sufficiently large area, planning and adjustment of the production flow lines will not be possible.

However joint factory buildings have their problems:

1. There is the possibility that each work compartment may interfere with the other because of the different nature of production, for example, smoke, dust, vibration and noise of one work compartment may affect the other compartment. Therefore, when planning each work compartment in a joint factory building, smoke, dust, vibration and noise of each must be within the sanitation standards and allowed limits of production.

2. Ventilation of a large area factory building is a problem that is not easily solved. Especially in southern regions, ventilation during summer is a major problem. If mechanized ventilation is used, the one time investment is large and often the cost of electricity and maintenance is great.

3. There are definite difficulties in management. The joint factory buildings have many work compartments of different production characteristics and these necessarily bring about difficulties in management. If a definite management level is lacking, production may be affected by mutual interference.

4. One of the more outstanding problems of the joint factory building is the problem of fire prevention. Because the area of the factory building is large, a fire can easily spread and fire fighting is more difficult. The loss incurred will be much greater than a medium or small sized factory building. Reinforced concrete structures are very good insulating materials against fires. But steel structures are not. Under 450°C, they will lose their load bearing capability. In a joint factory building, tubing and ventilation equipment are mostly placed inside the spaces between the frames of the buildings. Since the joints of the frames must also be able to hold suspended loads, the frames are often steel. Therefore the area of the factory building is limited by the standards for fire prevention. Installing automatic fire fighting equipment inside the factory building can raise the limitations on the area of the factory building but the construction costs are higher.

Whether the area of the large area joint factory building should be large or smaller is a question that has many different viewpoints in various nations. In the United States, public utilities are developed, the price for electricity is low, artificial adjustment of indoor climates can be used, therefore the Americans advocate larger areas. In Europe, the price for electricity is higher, and generally consideration is given to the utilization of natural light and natural ventilation, therefore a smaller area is advocated. According to the present situation in our nation, natural light and natural ventilation should be utilized as much as possible, and the management level is not high, thus the area of joint factory buildings should be smaller.

(3) The third trend in modern industrial buildings is the use of multiple story factory buildings. In cities, land is generally very scarce, and prices for parcels of land are high, therefore building factories in cities should conserve the use of land as much as possible. In farm villages, land for agricultural use is also precious and conservation of land should also be practiced. Multiple story factory buildings have provided the condition for conservation of land. Light industry factories, electronics and electrical appliances factories, instruments and meters plants and light machinery processing plants can all utilize multiple story factory buildings. In recent years in our nation's large and medium sized cities, the proportion of multiple story factory buildings have increased. In foreign countries, foundry shops for mass production have also used multiple story factory buildings. Multiple story factory buildings have already become a trend of development in industrial buildings.

Some problems still exist in multiple story factory buildings, such as the vibration of the equipment that causes the factory building to vibrate, thus affecting the accuracy of testing and precision of processing, and the problem of the effect of oil from the machinery upon the floor boards.

(4) The fourth trend in modern industrial buildings is the creation of a good working environment for production. The working environment should

include light, heat, ventilation, reduction of smoke and dust, reduction of noise, color, and service facilities. A good or bad working environment not only affects the health of the workers but also affects the efficiency of production. Foreign industrially advanced capitalist nations place a lot of emphasis upon working environments. Our nation also places emphasis upon labor protection but because of insufficient understanding, the working environment inside factories remains to be elevated. In the past, there was an insufficient understanding of the damage caused by noise and it was believed that noise only affected man's hearing. In actuality this is not only so but being in a noisy environment for a long period will not only affect man's nervous system and cardiovascular system but it may seriously cause heart diseases. Last year, the state issued regulations stipulating that the level of sonic pressure of noise at places of work must not surpass 85 decibel A. The noise level in many shops is still higher than this level, and everyone's efforts are needed. Another problem is the insufficient recognition of how to handle the function of colors. Color treatment has already become an indispensable link in modern industrial factory buildings in foreign nations. Color treatment can elevate the efficiency of indoor lighting to give the environment inside the factory buildings a sense of brightness, reduce fatigue of the eyes of workers, heighten the workers' enthusiasm in production, elevate the efficiency of production and the quality of products and reduce accidents related to production. All that does not require a lot of expenditure and that will benefit socialist production should be actively promoted to create a good environment for the workers for production.

This article was written in conjunction with the "academic discussion meeting on structural systems for industrial buildings" to be held this year by the Committee on Structures of the Chinese Architecture Society. Its purpose is to stimulate everyone's interest in discussing these questions and to prepare the conditions for a good conference. It is hoped that the mistakes in the article can be pointed out and criticized by readers.

9296
CSO: 4008

BRIEFS

FUJIAN TELECOMMUNICATIONS--Fuzhou, 2 Oct (XINHUA)--A new integrated circuit telephone exchange that can handle 10,000 telephones has gone into use in Fuzhou, capital of Fujian Province, in southeast China. This will improve the province's telecommunication facilities. An automatic exchange has been installed in Xiamen, a major coastal city in the province. A long-distance communication symmetric cable carrier wave, which runs from Fuzhou to Xiamen and to Zhangzhou City, is under construction. The section from Fuzhou has already gone into use. When the project is completed, Fuzhou to Putian, Quanzhou, Xiamen, Zhangzhou and other coastal cities and counties will open long-distance automatic or semi-automatic dialing. [sentence as received] Apart from installing China-made automatic exchanges, Fuzhou plans to import advanced telecommunication equipment. Fujian Province plans to build a microwave circuit that runs from Fuzhou to the southern part of the province and a satellite communication ground station. [Text] [OW051145 Beijing XINHUA in English 0742 GMT 2 Oct 80 OW]

SHANGHAI INTEGRATED CIRCUITS--Shanghai, 7 Oct (XINHUA)--Three series of small-scale integrated circuits for electronic computers and digit-control equipment have been put into serial production in Shanghai, East China. These products, which China previously had to import from abroad, are of the SN74, SN74H and SN74S series now in common use internationally. They are expected to facilitate China's designing and manufacturing of small, standardized computers of high operating speed and reliability. Examination by experts concluded that the quality and performance of the new products and their technological parameters are up to advanced world standards. [Text] [Beijing XINHUA in English 0706 GMT 7 Oct 80 OW]

JIANGSU MICROWAVE RECEIVER--After 2 years of work, three engineers and two assistant engineers at the solid state devices research institute, Nanjing, Jiangsu, have developed a microwave receiver which is useful in developing microwave devices, satellite communications, radar and so forth in our country. [OW071105 Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 5 Oct 80 OW]

GANSU LONG-DISTANCE TELEPHONE CIRCUITS--A set of advanced microwave long-distance telephone circuits installed by the Gansu Provincial Posts and Communications Department will go into operation in Lanzhou Municipality on 11 October. The new circuits connect Lanzhou with Benjing, Shanghai, Hankou, Chengdu, Chongqing, Changsha, Kunning, Jinan, Nanjing and six major cities of the country. [Lanzhou Gansu Provincial Service in Mandarin 1125 GMT 30 Sep 80 SK]

CSO: 4007

BRIEFS

TRADITIONAL CHINESE MEDICINES--Kunming, 12 Sep (XINHUA)--A society of traditional Chinese medicine and natural medicine has been set up at a symposium on the production and use of traditional medicines held in Kunming, southwest China. The society will function under the aegis of the Chinese Pharmaceutical Association. More than 800 pharmaceutical factories throughout China now produce nearly 3,000 types of traditional Chinese medical preparations, according to speakers at the symposium. The speakers exchanged views on the theory and application of traditional Chinese medicine and discussed the use of extracts from plants, marine products, animals and minerals as ingredients of Chinese medicines. More than 800 papers were submitted, some of which were discussed at the symposium. [Text] [Beijing XINHUA in English 1210 GMT 12 Sep 80 OW]

MEDICAL NEWS--Beijing, September 1 (XINHUA)--China has built up a network of 40 tumor hospitals and institutions for cancer research, some of which are in high-incidence areas. They are concentrating on studying gastric cancer, esophagal cancer, liver cancer and cancer of the lung. The General Hospital in Nanjing army units in Jiangsu Province has come up with its first multi-purpose computer for medical use. It is claimed to be able to work out diagnosis, figure out prescriptions, store data and handle statistics. Hypertonic citrate adenine solution which preserves human kidneys for transplant operations is being produced and used by the Shanghai central blood center and the Changzheng Hospital. The solution can keep a kidney useable for up to 30 hours and 38 minutes. An infrared T.V. camera for photography of the eye has been developed by the Changchun Institute of Optical and Precision Machinery and the Norman Bethune Medical College. [Text] [OW010722 Beijing XINHUA in English 0712 GMT 1 Sep 80]

FETUS DEFECT TESTS--Beijing, 19 Sep (XINHUA)--Beijing's municipal family planning research center is using a simple blood test to detect neural tube defects in fetuses from the 14th to 20th weeks of pregnancy. The test, called immunodiffusion radioautography, is advanced by Zheng Zhenqun, a lecturer at Shanxi Medical College. It is used to detect the A (alpha) fetal protein contents in blood serum of the mother. The standard a fetal protein contents of normal fetuses in different weeks of pregnancy were established by the center between 1978 and 1979 in tests on 695 pregnant women. Gu Sujuan, head of the center, said that the A fetal protein contents of pregnant women who have fetuses of neural tube defects can be much higher than normal, but it also happens in twins and fetuses which died in uterus. Therefore, the blood test results have to be checked by ultrasonic chart examination. The accuracy rate of the test is about 75 percent. But this method, simple and acceptable, can be used as a clinical screening for neural tube defect fetuses. [Beijing XINHUA in English 1244 GMT 19 Sep 80 OW]

CSO: 4020

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

BRIEFS

PRC-UN UNIVERSITY TIES--Beijing, 2 Jul--Dr James M. Hester, visiting rector of the United Nations University, signed an agreement in Beijing Tuesday with Li Chang, vice president of the Chinese Academy of Sciences, on cooperation between the two organizations. Under the agreement, the university, whose headquarters is located in Tokyo, and the Chinese Academy will cooperate with each other in research on natural resources and other sectors. This is the first time that such a full-scale agreement has been signed by the UN University with China. Hester also signed Tuesday a separate agreement with the Chinese Institute of Geography under which the institute will become an associated institute of the university. Under the two agreements, the university will cooperate closely with China in the future on various research projects, including those concerned with agricultural and marine production in the southern part of China. The university also is scheduled to hold a research meeting in Beijing in September on cultivation and utilization of land. [Tokyo KYODO in English 0024 GMT 2 Jul 80 OW]

FILM GROUP TO JAPAN--Beijing, August 27 (XINHUA)-- A film group from the Beijing Scientific and Educational Film Studio will leave Beijing for Japan tomorrow. This first group from China to shoot a scientific film in a foreign country is composed of scenarist and director Zhang Qing and two cameramen, Wang Fengming and Liu Jianzhong. An 80-minute science film "Notes on Japan" will cover scientific industrial management and mechanized farming, as well as scenes of local color. Fifty-year-old Zhang Qing has been in film work for nearly thirty years. She wrote and directed the film "Biological Evolution" on plants and animals. The film won an award for the best films this year from the Ministry of Culture. Another of her films "Earthquake" has had the biggest circulation in this country with more than 9,000 copies. Wang Fengming shot both films. Hu Benli, director of the Beijing Scientific and Educational Film Studio, said that the group's visit was arranged in accordance with an agreement between the China Film Co-production, the Beijing Scientific and Educational Film Studio and the Iwanami Film Studio of Japan. A Japanese film group had returned home after shooting two 20-minute films on China's physical geography, industry and agriculture. [Text] [Beijing XINHUA in English 1208 GMT 27 Aug 80 OW]

ASIAN, PACIFIC SCIENCE MEETING--Beijing, August 25 (XINHUA)--An Asian and Pacific regional consultative meeting on science and technology opened here today. The meeting is convened by the U.N. Economic Social Commission on Asia and Pacific (E.S.C.A.P.). It will discuss the strengthening of regional scientific and technological work and cooperation among regional countries in line with the 1979 Vienna programme of action adopted by the U.N. conference on science and technology for development. Attending the meeting are representatives from Australia, Bangladesh, China, India, Malaysia, Nepal, New Zealand, Pakistan, Papua New Guinea, the Philippines, Sri Lanka and Thailand as well as representatives from some United Nations institutes. J.B.P. Maramis, executive secretary of the E.S.C.A.P., presided over today's opening ceremony. Jiang Ming, vice-minister of the State Scientific and Technological Commission of China, made a speech at the meeting. To mark the occasion, a reception was given by Wu Heng, vice-minister of the State Scientific and Technological Commission, in the great hall of the people this evening. [Text] [OW251614 Beijing XINHUA in English 1607 GMT 25 Aug 80]

CSO: 4020

PUBLICATIONS

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9296
CSO: 4008

AUTHOR: None

ORG: Urea Group, Nitrogen Fertilizer Laboratory, Shanghai Chemical Industry Research Academy , Ministry of Chemical Industry

TITLE: "Thermodynamic Computation of Gas, Liquid Equilibrium in NH_3-H_2O System (First Report)"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 1, Feb 80 pp 2-5

ABSTRACT: The need for developing a work procedure for urea rekindled the interest in the ammonia-water system, especially the occasion of encountering thick aqua ammonia in the production process. An experiment work on gas, liquid equilibrium of the NH_3-H_2O system was carried out to find a simple model of thermodynamic expression that is capable of precisely describing the nature of equilibrium of gas, liquid in the system under the condition of $X\ NH_3 \geq 0.4$, $t = 30 \sim 60^\circ C$, $P = 2.30 \sim 23.8$. The experiment proved that the computation results are satisfactory. On this basis, a block diagram for computing p, y from T, X is offered to provide a computation model for engineering designing.

AUTHOR: SHI Yajun [2457 0068 6874]
ZHUANG Yongding [8369 3057 1353]
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XIANG Yangzhi [0686 0111 0037]
ZHENG Zhisheng [6774 1807 3932]
SUN Xuanjun [1327 3872 0689]
TAM Shunde [6223 7311 1795]

ORG: All of Shanghai College of Chemical Industry

TITLE: "Solvent Elementary Sulfur Method of Removing Sulfides in Gas Phase (Dymethyl Sulfoxide Method)"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 1, Feb 80 pp 8-10

ABSTRACT: For the developing petrochemical, chemical fertilizer, and metallurgical industries, coal is used as the major fuel with gradually increase of the petroleum ratio. In gasified coal, oil field by-product gas, or natural gas, sulfides exist, mostly in the form of hydrogen sulfide with some organic sulfides such as CS_2, COS, RSH, etc. These sulfides corrode the equipment, cause the catalyst to be poisonous, and pollute the atmosphere; therefore, they must be removed. There are many desulfurizing methods and the choice depends upon the fuel and its sulfide contents. This paper introduces a new method of using organic solvent as the absorption agent. It can remove gaseous phase sulfides and produce sulfur at the same time. The chemical theory, the experimental method, and the needed equipment are described.

AUTHOR: CAO Huizhang [2580 2585 3361]
LENG Shouci [0397 1108 1964]

ORG: Both of Shandong College of Agriculture

TITLE: "Research on the Fertilizer Effect of Nitric Acid Suspension Phosphate Fertilizer"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 1, Feb 80 pp 10-13

ABSTRACT: At present, the major phosphate fertilizer used for agricultural production in China is calcium perphosphate. With the increased unit yield of recent years and the expansion of high yield acreage, the quantity of calcium phosphate cannot meet the demands. Meanwhile, the aqua ammonia and ammonium carbonate produced by fertilizer plants of the county level are not chemically stable. After transportation, storage, etc. the nutrient utilization rate and the economic effects are poor. For the purpose of resolving these problems, the Shandong Provincial Institute of Chemistry studied and successfully made a new nitrogen-phosphorus complex fertilizer, with diluted nitric acid (36-38 percent) and ground phosphate rock (P_2O_5, 22-23 percent.) The major purpose is to utilize fully the intermediate to low grade phosphate rock which is plentiful in China. The experimental procedure is reported.

AUTHOR: GUO Bosheng [6751 0130 3932]
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ORG: GUO of Research Academy of Colored Metals, Ministry of Metallurgy; NING of Hunan Provincial Academy of Agriculture

TITLE: "New Type of Trace Element Chemical Fertilizer--Nitric Acid Rare Earth"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 1, Feb 80 pp 14-18

ABSTRACT: Trace elements are an important part of modernized chemical fertilizer industry. An experiment of field study and laboratory research on the fertilizer effect of rare earths began in China in 1972, and a considerable amount of data have since been obtained. The data concerning the yield increase effects of liquid or solid $RE(NO_3)$ and $RECl_3$ on wheat, rice, corn, kaoliang, soybean, and vegetable crops are reported. The experimental results indicate that rare earth may promote nutritional growth, and the absorption and transfer of phosphorus of crops.

AUTHOR: None

ORG: Department of Scientific Research, Beijing Chemical Industry Experimental Plant

TITLE: "Summary of Intermediate Test of Improved Hydroquinone Desulfurization"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 1, Feb 80 pp 19-22

ABSTRACT: At present, the Beijing Chemical Industry Experimental Plant uses a modified arsenic method of desulfurization, with the arsenic content as high as 40 g/ ml to present a great danger to the health of the workers and the environment. Among domestic plants of ammonia synthesis, 2 major methods of desulfurization, the modified A.D.A. method and the aqua ammonia catalysis method, are generally adopted. At present, the supply of A.D.A. is a serious problem; even the raw materials have to be imported. The merits of the aqua ammonia are the fact that the raw materials of ammonia and hydroquinone are both easily obtained. The shortcomings are the fact that the degree of purification is not stable, the rate of secondary reactions is high, and the consumption of ammonia is extensive. Based upon foreign and domestic literatures, an experimental design of Na_2CO_3 - HO OH was proposed to result in a 10 percent increase of desulfurization rate, obvious reduction of soda consumption and the rate of secondary reactions, and an efficiency close to the modified A.D.A. method.

AUTHOR: None

ORG: Research Institute of Industrial Science, Shaoguan District, Guangdong Province

TITLE: "Making High Nitrogen Compost Fertilizer Through Pressurized Ammonia Oxidation of Peat"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 2, Apr 80 pp 2-6

ABSTRACT: The Shanxi Institute of Coal Chemistry, Chinese Academy of Sciences developed the technique of pressurized ammonia oxidation of efflorescent coal or brown coal to produce high nitrogen compost fertilizer a few years back. With respect to peat, the method of direct ammonification with aqua ammonia to produce humic ammonium is adopted in most cases. This method is simple and easy to do in native circumstances, but the nitrogen content of the product is low and the rate of organic matter utilization is not high either. For the purpose of reasonably utilizing this resource, an experiment was carried out to proceed with pressurized ammonia oxidation of peat. The reaction temperature, the pressure, the timing, and different degrees of stirring were preliminarily studied before the processes of selecting a catalytic agent to reduce the reaction pressure and using air to replace oxygen to improve the nitrogen content. The procedure and the conditions of the experiment, and the preliminary results of field tests are reported.

AUTHOR: None

ORG: Sichuan Chemical Industry Plant

TITLE: "Condition of Operation of the Work Procedure of Filling Globular Catalyst in the φ 800 Triple Casing Pipe Ammonia Synthesis Tower"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 2, Apr 80 pp 7-11

ABSTRACT: With the help of Zhengzhou University, Sichuan Chemical Industry Plant experimented with the work process of filling in the old system No 3 ammonia synthesis tower, the φ800mm triple casing type, with the globular catalyst experimentally made by Zhengzhou University. The temperature raising reduction process began on 24 Dec 78, and the production began 6 days later. In the past 6 months, the condition of operation has been satisfactory. The effect of the catalyst in raising the tower's capacity, reducing the energy consumption, improving the temperature distribution condition, etc. has been proved to be obvious. The work of filling the globular catalyst, and the conditions of reduction and operation are reported.

AUTHOR: LI Aiqing [2621 1947 3237]

ORG: Division of Science and Technology, Shengli Petrochemical Plant, Shandong Province

TITLE: "Application of the Ammonia Absorption Cooling System in Shengli Petrochemical Plant"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 2, Apr 80 pp 26-28

ABSTRACT: This paper explains the basic principle of the ammonia absorption cooling system. The First Chemical Fertilizer Factory of Shengli Petrochemical Plant installed [illegible] ammonia absorption cooling systems with a total investment of 1,283,500 yuan. These systems were put to production toward the end of 1972. The economic properties of the ammonia absorption equipment and the compression cooling equipment are compared in terms of capital investment, production cost, and maintanence cost. It is the conclusion of the study that ammonia absorption cooling system is suitable when the evaporation temperature is lower than -15°C, the cooled water temperature is low, the water is plentiful, the price of steam is low, and there is waste heat to be utilized.

AUTHOR: CHEN Tianlang [7115 1131 2697]

ORG: Department of Chemistry, Sicuan University

TITLE: "Introducing a New Iron Fertilizer--Urea Iron"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 2, Apr 80 pp 68-69

ABSTRACT: Plants usually contain 0.00190-0.015 percent of iron in the body. Previous research studies have proved that iron is not the component of chlorophyll, but iron is a contact agent in the process of chlorophyll formation and is also the important element of some oxidization enzymes. It also directly participates in plant respiration; therefore, it is necessary for the normal growth of plants. To this day, there remains no ideal iron fertilizer, however. Those which are believed to be highly effective in foreign countries are not adopted in China either due to their high prices or due to the fact that they are not produced in China in large quantities. Most recently, the North China University of Agriculture introduced a liquid iron fertilizer with a low iron content of 0.4 percent. It is also not convenient to store or transport. This paper introduces a new iron fertilizer, a complex of urea and iron, in green colored solid crystals. It contains about 9.3 percent of iron and about 35 percent of nitrogen. Test results of this new iron fertilizer are reported. There is no mention of the producer, however.

Chemical Fertilizer.

AUTHOR: WANG Zhizhong [3769 3112 0112]

ORG: Yinshan Phosphate Fertilizer Plant, Sichuan Province

TITLE: "Investigations Into the Common Calcium Production Portion of the Medium Low Grade Jinhe Phosphate Rock"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 3, Jun 80 pp 13-18

ABSTRACT: For the purpose of improving the quality and reducing the cost of production, the project of studying the calcium production characteristic of the medium low grade Jinhe phosphate rock was launched. The Fe_2O_3 content of the rock is relatively stable, 3-4 percent; the R_2O_3 content is about 6-12 percent. The R_2O_3/P_2O_5 remains 23-53 percent, 3-6.5 times of the reasonable upper limit for producing common calcium. The MgO content is 2.5-4 percent; the MgO/P_2O_5 remains 10-15 percent, more than double the reasonable upper limit. The CO_2 content is 5.42-7.36 percent. Following a thorough analysis of the mineral and the work procedure, it is the conclusion of the study that the key to improvement is to control the maturation temperature of the late stage and the control of the density of the slurry.

AUTHOR: LIAO Jincai [1675 6930 2624]

ORG: Zhangshu School of Agriculture, Jiangxi Province

TITLE: "Preliminary Study on Diluted Sulfuric Acid Treatment of Low Calcium Efflorescent Coal to Improve the Humic Acid Productivity"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 3, Jun 80 pp 29-32

ABSTRACT: With the development of humic acid type fertilizers in China in recent years, many organizations have used the technique of raising the humic acid content of the raw material coal [peat?] as the basis for improving the quality of the products. Many methods, including treatment with nitric acid or hydrochloric acid, etc. have been tried, but due to the fact that the cost of nitric acid, etc. is high there has been no way to extend these methods. Industrial waste sulfuric acid is plentiful, however. An experiment is, therefore, designed to use waste sulfuric acid of a density of about 20 percent to treat low calcium efflorescent coal and a result of 30 percent increase of the humic acid productivity is obtained. In an expanded experiment in cooperation with Yichun Compost Fertilizer Plant of Jiangxi Province, the humic acid content of the products is greater than 60 percent, the water solubility greater than 50 percent, and fast nitrogen greater than 5 percent. The experimental data and procedure are reported.

AUTHOR: LI Qijiong [2621 7871 3518]

ORG: Dongfeng Chemical Fertilizer Plant, Shandong Province

TITLE: "Industrial Application of Propylene Carbonate Decarbonization"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 3, Jun 80 pp 43-49

ABSTRACT: Using propylene carbonate (P.C.) as a solvent to remove carbon dioxide from mixed gas is a new technique in the process of being developed. The technique has the general merit of low energy consumption of the physical absorption process, and is stable, poisonless, noncorroding, and low volatile. After a small experiment of 13 kg/cm^2 was successfully completed, the Dongfeng Chemical Fertilizer Plant officially adopted it in Oct 78. The 8 months of test operation revealed that after using P.C. instead of washing with water, more than 200 kw of electricity was saved per ton of ammonia manufactured, the capacity of the absorption column was more than doubled, raw material gasification loss was cut into half, the purity and reclamation rate of CO_2 was high, and the cost of treatment was 45 percent lower. The equipment installation of the industrial application of the P.C. decarbonization process and the loss and production condition are introduced.

AUTHOR: CHEN Wuzheng [7115 0523 2973]

ORG: Nanhua Company Research Academy

TITLE: "Progress in Industrial Catalysts for Ammonia Synthesis"

SOUCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 3, Jun 80 pp 58-66

ABSTRACT: This paper discusses briefly the progress in catalysts used in ammonia synthesis industry in increased varieties and improved quality in the past 60 plus years since synthesized ammonia was first created. The improvements are especially important in the fact that the equipment used for ammonia synthesis may thus be serialized and expanded. Several major catalysts used by the ammonia synthesis industry are separately assessed, with emphasis on the new results of research on producing catalysts for China's large scale ammonia synthesis plants since the National Chemical Fertilizer Catalysts Work Conference in 1979. Finally, future developmental prospects in these catalysts are estimated, and certain short term goals and intermediate and long term developmental directions are suggested.

AUTHOR: None

ORG: Southwest Research Academy of Chemical Industry, Ministry of Chemical Industry

TITLE: "Research on Two-Step Transformer Cap Portion Heat Resistant Catalyst Z-204R Has Succeeded"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 3, Jun 80 p 73

ABSTRACT: **Two different** catalysts are generally used in the 2-stage transformers used in large ammonia plants introduced to China from foreign countries. The C_{15-1} heat resistant catalyst is filled in the upper level and the $C_{11-9-02}$ catalyst is used to fill the lower level. First of all, the upper catalyst has a chemical temperature reduction action to reduce the temperature of the gas from 1250°C to 1100°C after passing through this level of heat resistant catalyst which also resist the flushing capacity of the gas current to insure even distributon. For this reason, the upper level catalystis beneficial as well as necessary. Several years ago, the Z-204 catalyst, similar to the $C_{11-4-03}$ made in the USA was successfully made by the academy. More than a year's use has proved it to be of good quality. The academy again successfully made the Z-204R which can be used to replace the C_{15-1} made in the USA. Z-204 and Z-204R now may be used in coordination to meet the needs of large scale ammonia synthesis plants.

AUTHOR: XU Chuanjiang [1776 0278 3068]

ORG: Shanghai Nanhui Chemical Fertilizer Plant

TITLE: "Application of Far Infrared Paint in the Electrical Heater of the Ammonia Synthesis Tower"

SOURCE: Shanghai HUAFEI GONGYE [CHEMICAL FERTILIZER INDUSTRY] in Chinese No 3, Jun 80 p 77

ABSTRACT: The Nanhui Chemical Fertilizer Plant began to use the new technique of far infrared heating, last year, in the electrical ovens. A good result has been obtained. During the major overhaul of equipment last year, the author and colleagues applied far infrared paint on the electrical heater of the synthesis tower and very obvious results of reduced consumption of catalytic agents, better temperature conditions, and lower consumption of power were obtained. The procedure and method of applying the paint are described. The paint should be dried under a temperature of $850-900^{\circ}$C. Due to lack of time, the author and colleagues assumed that the paint will solidify in the process of use and did not heat-dry it. The layer of paint has begun to peel. It will be examined, mended, and studied during next overhaul.

CSO: 4009

AUTHOR: ZHANG Xu [1728 3563]

ORG: Southwest Institute of Applied Magnetism, Mianyang

TITLE: "Some Advances in Applied Magnetism"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 6, 80 pp 2-4, 36

ABSTRACT: Although magnetic materials and devices are extensively applied in industry, agriculture, scientific research, and medicine, applied magnetism has become an independent technology no more than one to two decades. Now every year, an international conference of applied magnetism convenes to discuss this ever growing field of very complex contents. This paper introduces new advances in magnetic bubble technology, magnetic recording technology, permanent magnetic materials, microwave iron oxides, noncrystalline magnetic materials, magnetic separation technology. Products and techniques mentioned in the paper are either of unnamed origin , or a corporation of USA, or Japan. There is no mention of progress in applied magnetism in China.

AUTHOR: GUO Yunsheng [6751 0336 8508]
LIU Yanbiao [0491 1750 2871]

ORG: None

TITLE: "Time-Domain Reflectometer Technology"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 6, 80 pp 5-9

ABSTRACT: This paper introduces the basic theory of TDR and samples of application of simple TDR systems. The more complex TDR systems, such as the narrow band time-domain reflectometer NBTDR, which is not sufficiently precise and has not been extensively developed, and the automatic time-domain reflectometer TDANA which is currently being developed, are briefly mentioned.

AUTHOR: GU Bochun [7357 2672 2504]
ZHANG Yonggang [1728 3057 0474]

ORG: None

TITLE: "Research on Far Ultraviolet Exposure Technology"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 6, 80 pp 15-16, 39

ABSTRACT: This paper reports a study on the light source required for far ultraviolet exposure technology, and the needed light filter, shield, and photoetching film. These materials should have good spectral property within the scope of 2000-3000 Å wavelength. These materials are all made in China. At present, the experiment has successfully reproduced on a chromium plate figures with lines of a minimum size of 0.75 μm. When Xihua No 3 photoetching film is used, the exposure time is about 3 seconds. When polymethylacrylate is used as photoetching film, the exposure time is about 3 minutes. Hard contact method is adopted for exposure. The experimental method and the work condition are reported. The merits and shortcomings of far ultraviolet exposure technique are discussed.

AUTHOR: ZHAO Baojing [6392 0202 4842]
LU Minfeng [6424 3046 1496]

ORG: None

TITLE: "Introducing TTL Digital Integrated Circuit Products Made in China: (5) Medium Scale Registers"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in China No 6, 80 pp 37-39

ABSTRACT: This paper describes the following products: (1) Four-lock storage trigger (T452); (2) Four D type trigger (T451); (3) 4 x 4 register pile (T459). The circuits and logic diagrams of the above integrated circuits are given. Names of manufacturers of these are not given.

AUTHOR: (1) ZHANG Cairui [1728 1725 3843]
(2) PENG Chuancai [1756 0278 2088]
(3) ZHANG Qinglin [1728 3237 7207]
ZHOU Si [0719 7475]

ORG: (1) ZHANG of State-Operated Liaoyuan Machine Plant; (2) None; (3) ZHANG, ZHOU of Tianjin Broadcasting Instrument and Material Plant

TITLE: "Work Procedures and Equipment"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 6, 80 pp 40-43

ABSTRACT: Three papers are included in this column: (1) Review of printed circuit photographic process: Photographic plate making is the key work process in printed circuit manufacturing. The appearance of computer controlled graph generator in the 70's was a great leap forward; domestically the scanning photographic technique has also begun to be applied in recent years. Three photograhic techniques are compared for quality, economy, etc. (2) Effective measures for improving reliability of thermal compression welding: Two measures, using beryllium oxide capillary to improve capillary temperature and plasma washing technique are discussed; (3) Constant temperature electric solder iron: After repeated experimentation, the authors made an electric soldering iron with a magnetic switch inside to maintain a constant temperature. The Tianjin Broadcasting Instrument and Material Plant is about to produce this 50W soldering iron in large quantities and will be prepared to export it.

6168
CSO: 4009

AUTHOR: YI Mingguang [2496 2494 690D]
DING Yunling [0002 7301 6376]

ORG: None

TITLE: " Common Single-unit Circuits in Integrated Operational Amplifier"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 8, Aug 80 pp 18-2

ABSTRACT: Although there are now many types of integrated operational amplifiers to meet different types of needs, their internal circuits have many common characteristics. An understanding of these individual circuits that are common in most integrated operational amplifiers can help establish a foundation for analyzing and understanding the various integrated operation amplifiers. This paper introduces the following individual circuits: (1) Differential input circuit; (2) Constant current source; (3) Conversion circuit to change dual-terminal to single terminal; (4) Active negative load amplifier; (5) Direct current potential shift circuit; (6) Output stage circuit.

AUTHOR: LU Yiming [7627 1355 7686]
SU Guisheng [5685 2710 3932]

ORG: None

TITLE: "Deionized Water Quality Automatic Tester"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 8, Aug 80 p 24

ABSTRACT: In the process of producing semiconductors, the size of the resistance rate of the deionized water can directly affect the quality of the products. This paper describes an instrument made by the author which will send a signal automatically when a large quantity of deionized water is being used and when the resistance rate of the water is lower than the required standard. The circuit design and the process of making the instrument are reported.

AUTHOR: XIAO Jun [2556 1498]

ORG: None

TITLE: "Selection of Fixed Capacitor for Transistor Radio Receivers"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 8, Aug 80 pp 30-31

ABSTRACT: There are many types of fixed capacitors that can be used in transistor radio receivers. The various types have different capacities to make it difficult for a beginner to decide which one to choose to meet his needs. Based upon the function of the fixed capacitors in a radio, five types may be needed. The properties of major types of fixed capacitors are explained to enable the reader to match his needs with the properties of the capacitors.

6168
CSO: 4009

AUTHOR: HU Rushun [5170 3067 5293]

ORG: Shanghai Boiler Works

TITLE: "Discussion of Flaw Location for Ultrasonic Inspection of Curved Surfaces"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 1, Feb 80 pp 1-9

TEXT OF ENGLISH ABSTRACT: The paper presents a calculating method applied to the ultrasonic inspection of curved surfaces with angle probes. The location of a flaw can be determined directly from the screen since a flaw-locating rule is used. In addition, the following points are discussed via analysis of error: 1) the calculation for the allowable maximum K-value (tangent of the reflecting angle); 2) method for measuring the incidence point and K-values of the probe when the curvature radius of a workpiece is relatively small; 3) the range in which the locating method and the flaw-locating rule have to be used.

AUTHOR: GU Jueqi [7357 3778 3825]
WANG Fengxiang [3769 7364 4382]
CUI Longjun [1508 7127 0193]
et al

ORG: None

TITLE: "Study on Ultrasonic Probes Made of Lithium Iodate, Lithium Sulfate and Lithium Niobate Crystals"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 1, Feb 80 pp 10-15

TEXT OF ENGLISH ABSTRACT: This paper discusses the manufacture of the focused probes for immersion application and time-delayed probes both with narrow pulse and made of $Li_2SO_4 \cdot H_2O$, α-$LiIO_3$ crystals. It also describes the manufacture of the highly sensitive normal probes made of $LiNbO_3$. The preliminary test results show that the probes are good in performance when used in the ultrasonic thickness gauge Type SCH-I and Type SCH-II.

AUTHOR: YAO Zhizhong [1202 1807 1813]

ORG: Wuhu Shipyard

TITLE: "The Application of the Thin-Plate Test Block to Ultrasonic Inspection of Welds in Medium and Thin Steel Plates"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 1, Feb 80 pp 16-22

TEXT OF ENGLISH ABSTRACT: This paper describes the principle and methods of application of the thin-plate test block in determining locations and relative dimensions of defects in welds of medium and thin steel plates by the ultrasonic method, and the methods to measure the three parameters of an angle probe. It analyzes and compares the errors in the determination of locations of defects. The characteristics in the application of the equivalent size method are presented.

AUTHOR: JIANG Weizhi [1203 0251 0037]

ORG: Beijing Institute of Aeronautics and Astronautics

TITLE: "A Preliminary Attempt to Express the Brittleness of Nitrided Layer --An Application of the A.E. Technique"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 1, Feb 80 pp 23-28

TEXT OF ENGLISH ABSTRACT: It is suggested in this paper that the limiting plastic strain which a nitrided layer can undergo is a criterion for the crack initiation, so an approximate strain analysis is made for a nitrided bend sample, and a parameter $2(m + 2)\frac{\Delta_{PC} \cdot h}{S^2}$ is obtained, which may be used to characterize the brittleness of the nitrided layer measured by the A.E. technique. Using this parameter it is possible to provide an assessment basis for selecting and developing new nitriding techniques. This attempt is confirmed initially by the A.E. experiment on four nitriding steels. Within the scope of the ionic nitriding technique studied here, the sequence of the above-mentioned steels arranged according to the increasing brittleness of the nitrided layer is as follows: 40Cr, 20CrMnTi, 35CrMnSi, 38CrMoAl.

AUTHOR: CHEN Jincan [7115 6930 3503]

ORG: Wuhan Institute of Physics, Chinese Academy of Sciences

TITLE: "Thermoplastic Imaging and Its Application to Ultrasonic Holography"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 1, Feb 80 pp 29-31

TEXT OF ENGLISH ABSTRACT: This paper describes the principle of thermoplastic imaging, and gives the results of recording and optically reconstructing the ultrasonic holograms by means of transformation of optical conductive imaging and transmission of video signals directly from the ultrasonic holographic system to the thermoplastic light valve. It is shown that thermoplastic imaging can be used for real-time reconstruction of an acoustic hologram. Its practical application to NDT in the future is discussed.

AUTHOR: CAI Hongchi [5591 7703 3069]

ORG: Beijing Iron and Steel Research Institute

TITLE: "Melting Point Method for Quality Inspection of Brazing"

SOURCE: Shanghai WUSUN JIANCE [NON-DESTRUCTIVE TESTING] in Chinese No 1, Feb 80 pp 32-33

TEXT OF ENGLISH ABSTRACT: This paper presents the melting point method for quality inspection of brazing of stainless steel belts on blades. The components of the paint are given, and the test results show that the quality of the brazed blades can be reliably detected.

9717
CSO: 4009

AUTHORS: SUN Yiping [1327 4448 1627], CHEN Qing [7115 7230]

ORG: Institute of Construction Machinery, State Construction Committee

TITLE: "Research on Improving the Life of Mixer Blades in Forced-Action Cement Mixers"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 1-7

ABSTRACT: A weak point of forced-action cement mixers was short blade life (2,000-4,000 loads). Investigation of the factors governing lifetime led to a focus on blade composition and shape. Tungsten-alloyed cold cast irons were chosen as the most promising material. It was determined that a relatively hard matrix containing evenly-distributed, separate carbide particles was most resistant to the scraping wear involved. Tests of different tungsten alloys revealed that a composition of 15-18 percent tungsten produced a combination of the desired features. Tests of blades made with this alloy gave an average life of 11,370 loads. Because failure often resulted from breakage or upper edge wear, the shape of the blade was changed from a curved shape of variable thickness, subject to strains, to a flat blade of even thickness. The blade angle was changed from 45° to 5°. The result was an average blade life of 14,153 loads.

AUTHORS: FU Bingliang [0265 3521 5328], ZOU Fuqing [6760 4395 1987]

ORG: None

TITLE: "Experimental Development of a Torsional Vibration Damper"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 8-12

ABSTRACT: The drive train of the CL-7 scraper was subject to extreme vibration, resulting in drive shaft twistoff and damage to the vibration damper, when starting or stopping and while idling. Tests determined that there was a resonance between 400 and 460 rpm. It was decided to change the system's stiffness to move the resonant frequency out of the range of engine speeds. A vibration damper of reduced stiffness (12.32 rather than 34.8) gave much lower peak loads on starting and when idling (76 compared with over 200 kgm and 86 compared with 200 kgm) but could only transmit a torque of 72 kgm (compared with 92 for the original). A new design with a stiffness of 61.1 using a steel-powder metallurgical material rather than steel-phenol formaldehyde had a slightly higher stopping and starting torque (96 kgm) but a lower idling torque (40 kgm) and was capable of transmitting 175 kgm of torque. This device proced to have a lifetime 80 times that of the reduced stiffness vibration damper.

AUTHOR: None

ORG: Shaoxing Engineering Machinery Plant

TITLE: "Brief Introduction to a Half-Ton Loader"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 p 12

BASTRACT: The Dongfanghong 24Z half-ton loader is based on the Dongfanghong 24Z tractor. The bucket capacity is 0.25 m^3, with a rated load capacity of 0.5 tons. It can lift to 2.46 meters and clear a height of 1.76 m when dumping. The lifting mechanism is powered by two hydraulic cylinders rated at 4.4 tons each and the dumping mechanism by two cylinders rated at 3.5 tons each. The bucket can be lifted to full height in 18 seconds.

AUTHOR: HU Pengcheng [5170 7720 4453]

ORG: None

TITLE: "The MSZ-3 Volumetric Efficiency Indicator"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 13-14

ABSTRACT: The MSZ-3 volumetric efficiency indicator, which is used to measure the efficiency of hydraulic equipment, is an improvement on the 1974 SZ-3A digital volumetric efficiency indicator which makes use of integrated circuit technology. Its method of computing volumetric efficiency is altered: it measures the number N of rotations of the pump necessary to produce a certain flow volume Q_0, after which it determines the flow volume under load Q_1 produced in N rotations. If Q_0 is 1,000, then Q_1 gives the volumetric efficiency as a percentage. The device can also be used to determine the output of hydraulic pumps and to determine the ratio of two rotary speeds.

AUTHOR: LU Shoupeng [4151 1108 1756]

ORG: None

TITLE: "Productivity of Bucket Wheel Excavators"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No.7, Jul 80 pp 19-24

ABSTRACT: There are three different ways of figuring the productivity of bucket wheel excavators. The "theoretical productivity" is based only on bucket capacity and unloading speed under ideal conditions. The "technical productivity" takes account of actual working conditions involving different types of material to be excavated, incomplete filling of the bucket and the like. The "actual productivity" is simply the ratio of actual number of cubic meters loaded to time elapsed. Improved methods of allowing for bucket capacity are discussed and figures for various Soviet and European models given. The ratio of the theoretical to the actual productivity is discussed. Methods of determining the capacity of a belt conveyor to be used with the excavator are discussed and some figures for Japanese, Soviet and European models given.

AUTHOR: None

ORG: Tianjin Institute of Engineering Machinery, First Ministry of Machine Building; Yichun Engineering Machinery Works

TITLE: "The ZL-30 Loader"

SOURCE: Beijing GONGCHENG JIXIE [EINGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 25-29

ABSTRACT: The ZL-30 loader was developed in 1977-1978 by the Tianjin Institute of Engineering Machinery and the Yichun Engineering Machinery Works. It can be used in municipal construction, small-scale water engineering projects, agricultural construction and the like. It is usable with 4-8 ton trucks. The rated load capacity is 3 tons and the rated bucket capacity 1.5 m^3. Its maximum forward speed is 34 km/hr in second gear. The rated power is 94 HP and the device weight 10.06 tons. Diagrams of the hydraulic torque converter, transmission, drive axle, working hydraulic system, steering system and brake system are provided along with brief descriptions.

AUTHOR: LIN Jianya [2651 1696 0068]

ORG: Zhejiang University

TITLE: "Optimal Impeller Wheel Blade Output Angles for a Single-Stage Hydraulic Torque Converter"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 30-36

ABSTRACT: A single-variable model is used to compute the optimal impeller blade output angle for a hydraulic torque converter under rated operating conditions. The accuracy of the resulting equations is tested by using in them the parameters of 11 different torque converters (US, Soviet and other countries) for which optimal values can be assumed to have been found empirically. With optimal angles ranging from 35° to 109.5°, the calculated results never differ by more than 5°. Part of the discrepancy results from the fact that the calculated values are fluid flow angles and not blade angles.

AUTHOR: ZHOU Jiarui [0719 1367 3843]

ORG: Wuhan Engineering Machinery Plant

TITLE: "Analysis of the Assembly of the 3K Planetary Hoist and Machining of the Main Components"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 43-46

ABSTRACT: The essential parameters of the 5-ton model 3K planetary hoist are described. Machining involves three main components. In the case of the planetary gears, for ease of assembly it is required that the axis of symmetry of one gear valley be in the same plane as that of the key slot. The positions of the key slot and the gear valley are fundamental in positioning for machining. The machining of the frame and driveshaft assembly and the central gear is also described.

AUTHOR: HUANG Bingjiang [7806 4426 3068]

ORG: Guangdong Provincial Building Materials Machinery Plant

TITLE: "Flame Quenching of the Surface of an Inset Track in the Rotating Mechanism of a Tower Crane"

SOURCE: Beijing GONGCHENG JIXIE [EINGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 46-51

ABSTRACT: Flame quenching of the inset ball bearing race of the rotating meachnism of a tower crane is intended to produce a Rockwell C hardness of 50-55 for a depth of 2-3 mm. The surface is heated with an oxyacetylene torch to 900-930° C, air cooled to 830-860° over 7 seconds, then cooled with compressed air to 730-760° over an additional 7 seconds, after which it is water cooled. The optimal size of the flame, air and water jets is discussed and a design with all the jets integrated into a single head is described. The process is found to produce a hardness (HRC) of 56-52 in a 3 mm quench layer in 40 Cr steel, with a hardness of 48-27 in the transitional layer and a Brinell hardness of 179-194 in the interior. Photomicrographs of relevant metal sections are presented.

AUTHOR: LI Yingkai [2621 2503 0418]

ORG: Fushun Eacavator Plant

TITLE: "Introduction to an Automatic Hydraulic Large Gear Quenching Machine"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 p 50

ABSTRACT: Discarded parts were used in constructing a device for quenching of the teeth of large gears. The hydraulic device is automatically controlled. It can handle gears measuring 800-2000 mm in diameter and treat gear teeth measuring up to 500 mm. The heater can operate continuously for up to 3 minutes. The positioning is done manually.

AUTHOR: JIANG Xinnian [1203 2450 1628]

ORG: Huadong Construction Machinery Plant

TITLE: "Applications of Sealants in Engineering Machinery"

SOURCE: Beijing GONGCHENG JIXIE [EINGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 52-54

ABSTRACT: A major area of application of sealants is in the prevention of oil and fluid losses in construction machinery. New liquid high molecular weight compounds or "liquid gaskets" can be painted onto contacting curfaces and while remaining liquid can prevent oil leakage. In addition, they can easily even out irregularities in the contacting surfaces. So-called "anerobic adhesives" based on acrylic esters can set in the absence of air and are particularly useful in threaded connections. The brake belts of the JY-13 3 m^3 cement mixing vehicle use polyurethane adhesive to bond the friction belt to a metal base. Some problems involved with liquid sealants are: extending the usable temperature range, performance on surfaces of various shapes, and pressure requirements for sealing surfaces. A list of Chinese-produced liquid and anerobic sealants is given.

AUTHOR: WANG Kehuan [3769 0668 1403]

ORG: Beijing Research Institute of Coal Science

TITLE: "A 'Hard Facing-Welding' Method Combining Cemented Facing Material and Tubular Welding Rods Used with an Oxyacetylene Torch"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 55-56

ABSTRACT: Hard facing with such materials as tungsten carbide is a useful technique which has long been in use. But the thickness of the applied surface is limited to approximately the size of tungsten carbide grains. If an attenpt is made to produce a thicker surface, it will either have insufficient bonding strength so that the outer layers will crack off or the heat applied will cause the crystals in the inner to sink into the metal being hardened. A method is described in which a base layer of carbide grains is cemented on with water glass or a similar material, then heated until the crystals sink partially into the metal surface, after which an oxyacetylene torch is used to apply an additional layer of carbide using tubular welding rod. The method has been used to face mining drill bits, which have shown more than 5 times the durability of ordinary bits.

AUTHOR: LIU Fangyu [0491 5364 1342]

ORG: None

TITLE: "Improvements in the Hydraulic System of the Z425 Loader"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 pp 58-60

ABSTRACT: The Z425 wheeled loader showed a tendency to engine overload and overheating of the coolant and the hydraulic fluid. The reasons were incorrect selection of hydraulic system parameters and excessive fluid leakage. The CB46 gear pump had a much higher output than was needed by the hydraulic transmission and steering system even at peak load. This caused excessive leakage, and the excessive flows resulted in overheating and decreased viscosity of the hydraulic fluid. A changeover to use of the YBC-12/80 pump in the transmission hydraulic system and the YBC-30/80 pump in the steering system resulted in much lower, but still adequate, flow volume, largely solving the problem. Power consumption of the two hydraulic systems was reduced from 20.4 HP (21 percent of engine power) to 5.67 HP (6 percent of engine power). Performance tables are given.

AUTHORS: LI Defa [2621 1795 4099], BAI Bingying [4101 3521 5391]

ORG: Loading and Unloading Machinery Repair Plant, Xi'an Municipal Transport Company

TITLE: "Improvements in the Operating Structures of the High-Low Speed Selector and Rear Axle Disengage Mechanism of the Z425 Loader"

ABSTRACT: Both the high-low speed selector and the rear axle disengage mechanism of the Z425 loader used mechanical linkages which were operated by levers with a large travel distance. These were mounted on opposite sides of the cabin and were difficult to operate and got in the driver's way. Both devices were replaced by pneumatic linkages operated by simple slide valves, thus simplifying operation and making the cab layout more convenient.

AUTHOR: WENG Yunshu [5040 0061 2562]

ORG: Puyuan Engineering Machinery Plant

TITLE: "A Three-Ton Rail-Mounted Forging Handling Device"

SOURCE: Beijing GONGCHENG JIXIE [ENGINEERING MACHINERY] in Chinese No 7, Jul 80 p 62

ABSTRACT: The Puyuan Engineering Machinery Plant has developed a three-ton track-mounted forgings handling device. It consists of six main assemblies: the main carriage assembly, the front lifting mechanism, the rear lifting mechanism, the grasping head rotating mechanism, the carriage rotating mechanism and the grasping head close mechanism (hydraulically operated). The grasping head can hold blanks with a diameter of 100-550 mm and can move 5° upwards and 8° downward. The track is 2200 mm long, the dimensions are 5.67 x 2.8 x 3.23 m, and the device weighs 20 tons.

8480
CSO: 4009

AUTHOR: ZHAO Hongzhou [6392 4767 1558]

ORG: None

TITLE: "Yazuishou of Sciences--Metascience"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 80 pp 1-3

ABSTRACT: There is a mammal called Yashishou [Ornithorhynchus anatinus] having a mouth looking like the beak of a duck, yet it does not lay eggs. It is viviparous and is a transitional creature between a reptile and a mammal. There is also such a thing among sciences. The author refers to metascience, which, he claims, is like a natural science, using computation, simulation, model building, experimentation, and statistical analysis as its methods. It looks upon sciences as a social phenomenon, however. It assumes a position between natural and social sciences and is, simply speaking, a field of inquiry into the structure and development of science itself. The paper traces the origin and development of metascience from the end of the 18th Century, through the 19th Century, to the various related international discussion meetings, 1975-1977, held in Germany, France, or Poland. The bulk of the paper deals, in a haphazard way, the contents of metascience, while the fact that it is being criticized as merely a new version of the old natural philosophy of the 19th Century is also casually mentioned.

AUTHOR: LU Qi [7627 3825]

ORG: None

TITLE: "An Underground Palace of Wood in a Giant Scale--the Han Tomb of Dabaotai"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 80 pp 7-9

ABSTRACT: Dabaotai Han Tomb is the resting place of King Yan, LIU Dan [0491 2481] a member of the royal family (117-80 B.C.) The excavation of his burial chamber was carried out Aug 74 to Jun 75. It was revealed to be a giant complex, measuring 23.2 x 18 x 3.7 m, beneath a soil cover of 9-10 m in thickness. Although grave robbers obviously visited earlier, nearly 400 items of pottery, brass, iron, jade, agate, and silk artifacts were found. The iron articles were identified by Beijing College of Iron and Steel as being forged from steel produced from pig iron through a solid state decarbonation process, and were not heat processed cast iron. These may be said to be the oldest steel items discovered so far. The previous estimate for the invention of this steel-making technique must now be moved backward 3-5 centuries to the beginning of the first century B.C. the latest. The excavated tomb will soon be open to tourists, foreign and domestic. It is in the Fengtai District of Beijing, just to the north of the Beijing-Guangzhou Railway line.

6168
CSO: 4009

AUTHORS: SUN Shoucheng [1327 1108 2052], QIN Chengchang [4440 2110 2490]

ORG: None

TITLE: "The Intensity of the Liyang Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980
pp 1-4

ABSTRACT: Earthquakes occurred in Liyang on 22 April 1974 and 9 July 1979, with magnitudes of 5.5 and 6.0 respectively. Comparison of the lines of equal intensity for the two earthquakes show remarkable similarities as regards location of the epicenter and shape and size of the areas of various intensity levels. The patterns are related to geological and physiographic features. Four faults in the area played a particularly important role, but of especial importance in determining local intensities was the nature of the terrain, which was divided into three different types: exposed bedrock, marshy terrain, and an intermediate hilly and ridged terrain of relatively hard sandy and clayey soil. Damage was much greater in the marshy area than on the ridges.

AUTHORS: WU Zhenlin [0702 2182 2651], ZHANG Jinbo [1728 6930 3134],
ZOU Quansheng [6760 2164 3932], TONG Wu [0157 2976]

ORG: None

TITLE: "An Analysis of the Dynamics of Water Levels in Deep Wells"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980
pp 4-6

ABSTRACT: The question of water levels in deep wells is attracting attention as an earthquake prediction feature. However, some other perturbing factors must be taken into account in order to make the measurements meaningful. These include earth tides, air pressure, and precipitation. A sliding-average method is proposed for dealing with the contribution of earth tides. A regression formula relating air pressure to water level is presented. When graphs of actual water levels in the Xingyi well are compared with an expected normal range (whose actual values vary over the year), there are several striking instances of coincidence of abnormally low values in the period 1975-1978 with major earthquakes.

AUTHOR: Analysis and Prediction Laboratory, Hebei Provincial Seismology Office

ORG: None

TITLE: "A False Anomaly in the Horizontal Base Line on Red Mountain"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 7-8

ABSTRACT: In August and September 1977 there was a drop of 3 millimeters in the altitude of a peak on the Red Mountain Earthquake Station's short horizontal baseline. This proved not to be the result of geologic deformation. It resulted from two factors: uneven heat deformation of the two markers, and interference from underground water. The heat deformation factor proved to be cyclic over the year. The effect of underground water was taken into account by building a new baseline in which the southern marker was two concentric tubes, the outer serving as a casing and the inner attached only to the base-level rock. Markings on the inside of the casing made it possible to determine corrections to be made in the data.

AUTHOR: SU Luansheng [5685 7762 5116]

ORG: None

TITLE: "Annual Changes in Electrical Resistivity"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 9-11

ABSTRACT: Annual changes in electrical resistivity must be allowed for in assessing the results from observation stations. Some of these changes result from the observation system itself, being produced by changes in electrical insulation values, relative humidity of the air, electrical leakage and the like. Changes resulting from geological factors are produced by variations in ground temperature, and the movement and degree of mineralization of subsurface water, among other factors. The importance of these factors depends on the nature and depth of burial of the rock strata at the measuring station. Suggestions for siting of stations and overcoming the disadvantages of poor sites are given.

AUTHOR: MENG Fanxi [1322 4907 0823]

ORG: None

TITLE: "Brief Introduction to the SZ-2 Quartz Digital Clock"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 11-12

ABSTRACT: The SZ-2 auartz digital clock uses MOSFET integrated circuit technology, has very low power consumption and has a daily error of less than 0.5 second. It has a time-set circuit to allow setting in terms of a broadcast time signal. The output time signals range from days to thousandths of a second; there are various coded time outputs and a 50 Hz square wave signal. A circuit diagram is given.

AUTHOR: Water Chemistry Group, Analytical Laboratory, Hebei Provincial Seismological Office

ORG: None

TITLE: "Lessons of a False Alarm"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 13-15

ABSTRACT: On 6 April 1978 the Water Chemistry Group noticed elevated radon levels in water from the Wenan well, on the basis of which they predicted an earthquake of magnitude 5-6 or greater; the earthquake did not occur. Analysis of reasons for the false alarm indicated that this well showed an annual variation in radon levels, within which the observed level was normal. The radon level was found to be inversely related to the water level; in the first half year heavy irrigation lowered the water level, thus raising the radon level. The trend reversed in the second half year (with an exception during the September-October irrigation period), with the water level rising and the radon level decreasing.

AUTHOR: ZHOU Taiping [0719 1132 1627]

ORG: None

TITLE: "A Pocket Superlow-Frequency Signal Generator"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 15-16, 48

ABSTRACT: This device, designed for maintenance of earthquake equipment and field earthquake detection work, is a regenerative oscillator based on a BG301 operational amplifier. It has outputs of 1, 5, 10, 20 and 50 Hz, with either a one-sided undamped 6-volt signal or a symmetrical signal with a damping constant of 2/10000; the output resistance is 500 ohms, the waveform nonlinearity distortion coefficient is no greater than 3 percent, and the device uses 5 mA at 9 volts. The circuit equations are analyzed and the equivalent circuit presented.

AUTHOR: JIANG Zhong [1203 1813]

ORG: None

TITLE: "Information on the Guandun Magnitude 6 Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 17-18

ABSTRACT: At 2033 hours on 18 May 1978 an earthquake of magnitude 6.0 occurred in Guandun Commune, Yingkou county, Liaoning. It was an aftershock of the magnitude 7.3 Haicheng earthquake. Application of the Gutenberg logarithmic formula relating number and magnitude of shocks to the data between 1 July 1975 and the end of April 1978 indicated that no earthquake above magnitude 5 would occur. However, the short-term average magnitude of earthquakes had fallen well below the long-term average magnitude, indicating that a large earthquake was to be expected. Moreover the rate of energy release had also fallen below the long-term average by an amount equivalent to at least a magnitude of 4.5.

AUTHORS: TANG Rongchang [0781 2837 2490], LI Tianshao [2621 1131 4801]

ORG: None

TITLE: "The Dangxiong Earthquake of 1952"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 18-20

ABSTRACT: Earthquakes of magnitudes 8 and 7.5 occurred on 18 November 1951 and 18 August 1952 respectively in the Dangxiong region, Tibet. The article presents information on the latter earthquake. The intensity at the epicenter was 10, and the focus was 27 kilometers deep. The average attenuation along the long axis was 3.5 and along the short axis 6. The quake was located on the intersection of the Nuoqu-Dangxiong fault (running NE) with a group of east-west faults. The activity of these faults is shows by the existence of large numbers of hot springs along them, terrain deformations on opposite sides, the presence of fault subsidence basins and previous earthquake records. The shape of the earthquake area was governed primarily by the Nuoqu-Danxiong fault and the Jiuzila fault (WNW). Some hypotheses concerning the nature of the 1951 earthquake, for which data are scarce, are offered.

AUTHOR: ZHAO Chengda [6392 2052 6671]

ORG: None

TITLE: "Electrical Resistivity Anomalies in the Aftershocks of the Tangshan Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [EARTHQUAKE FRONT] in Chinese No 1, 1980 pp 21-22

ABSTRACT: The size (magnitude and duration) of resistivity anomalies measured at several stations in the vicinity of Tangshan was related to the occurrence of aftershocks of the magnitude 7.8 earthquake. It was found that the magnitudes of the anomalies before aftershocks of magnitudes 6.9 and 6.2 were much smaller than in the case of main earthquakes of the same magnitudes. When three aftershocks were considered in time sequence, the ratio of anomaly duration to shock magnitude increased over time: anomaly duration increased and shock magnitudes decreased. The aftershocks tended to be associated with a change of direction in the anomaly curve. Little work has been done on the relation between anomalies and aftershocks. The main difference seems to be that the anomalies are smaller for aftershocks than for main quakes; this may be because an energy release process is involved rather than an energy accumulation process as in the case of main earthquakes.

AUTHOR: Laboratory No 2, Prediction and Analysis Center, National Seismological Office

ORG: None

TITLE: "Earthquakes in 1979"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 22, 24

ABSTRACT: A table listing 18 earthquakes of magnitude 7 or greater throughout the world in 1979 is presented, along with a table listing 24 earthquakes in China of magnitude 5 or above. Of these, 19 were of magnitude 5-5.9 and 5 were of magnitude 6-6.9; earthquake activity was slightly higher than in 1978. Maps of earthquake distribution worldwide and in China are given.

AUTHOR: ZHANG Yong [1728 1661]

ORG: None

TITLE: "The Tonghua Magnitude 1.0 Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 23-24

ABSTRACT: On 31 August 1977 an earthquake of magnitude 1.0 was registered in Tonghua County, Jilin Province. The intensity was as high as 4 at the epicenter. Ground electricity anomalies had been observed in the vicinity 50 days before the earthquake. ERTS photographs show three faults in the vicinity of Tonghua whose interaction was probably responsible for the earthquake. Minor earthquakes in 1975 and 1978 were probably also related to these faults. The high intensity of the quake is probably accounted for by a shallow focus.

AUTHORS: NI Guilin [0242 2710 2651], ZHOU Guixiang [0719 2710 7449]

ORG: None

TITLE: "An Initial Analysis of the Relationship Between Drought Regions and Earthquakes"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 25-26

ABSTRACT: Rainfall records at 140 meteorological stations in Jiangsu, Shandong, Anhui and Zhejiang provinces between 1953 and 1978 were compared with records of earthquakes of magnitude 4.0 or greater in search of correlations. Of 27 earthquakes of magnitude 4.0 or above, 24 were in areas which were on the edge of a drought area in the previous year. In the case of the three earthquakes of magnitude 5.0 or above, all were in areas where the drought had covered at least 240,000 square kilometers and in which the rainfall deviated more than 40 percent from normal. A measure of drought severity (area times intensity) correlated well (r = 0.80) with the magnitude of the associated earthquake in the following year. In addition, for years whren this value was high, an earthquake of 4.0 or stronger followed in 16 of 21 cases; when the value was extremely high, the figure was 10 of 11 cases. Some earthquakes occurred in areas of good rainfall within drought regions. In 1978 a severe drought occurred in the four provinces, leading to a forecast of an earthquake of magnitude 5.5 or above; earthquakes of magnitudes 5.3 (2 March) and 6.0 (9 July) occurred in the following year.

AUTHOR: XIA Yiliang [1115 1355 3213]

ORG: None

TITLE: "A Table of Earth Magnetism Components"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 27-28, 31

ABSTRACT: When nuclear spin devices are used to determine the total strength of geomagnetism and the vertical component, calculation of the horizontal component is a time-consuming process. The principles for constructing tables that can be used to determine the components simply are described and the tables are constructed. An error analysis shows the error to be within acceptable limits.

AUTHOR: CHEN Weiting [7115 4850 1694]

ORG: None

TITLE: "Torsional Damage"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 29-31, inside back cover

ABSTRACT: Examples of torsional damage have occurred in many earthquakes. Explanations have been offered in terms of structural asymmetry, torsional movements of the earth's surface, and dislocations at the earthquake focus. Symmetrically-designed structures may have asymmetrically distributed facilities inside or a slight lean, or may be made asymmetrical by earthquake action (cracking and the like). Extremely complicated motions of the earth's surface have been observed, including "seiving" motions which could produce torsional damage. As to the effect of dislocations at the focus, one theory is that they can produce a torsional effect as a result of passage of the seismic wave through geological structures of different composition.

AUTHOR: HUANG Zhenping [7806 2182 1627]

ORG: None

TITLE: "Interference of Strong Vibrations with Ammeters"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 32-33

ABSTRACT: Strong vibrations can produce fluctuations in the output of ammeters used in earthquake research. The result of lateral movement on an Fc6-120 instrument is analyzed and found to be slight, although vibration damping is recommended. Torsional movement, however, can produce considerable fluctuations, which are illustrated for the Fc6-120 ammeter.

AUTHOR: Lu Qigu [7120 0366 7711]

ORG: None

TITLE: "Detection of Ultramicroseisms"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 33-34

ABSTRACT: Ultramicroseisms are shocks of magnitude +1 to -1; some devices can detect them as low as magnitude -2. These may in some cases precede a major earthquake, as in the case of the Liaonan quake; in other cases, such as Tangshan, they are absent. A logarithmic relationship between period and magnitude has been established, according to which vibrations of M = -1 are at frequencies of about 40 Hz, so that a good machine design would be sensitive to about 60 Hz. The authors' machine has a range of 8-60 Hz, with an amplification factor of 1-10 million. Ultramicroseismometers first came into use in China in 1971-72, and tests were made in the Beijing area in 1976. The devices are effective in detecting ultramicroseisms at ranges up to 100 km; at 200 km they have about the same detection capability as ordinary microseismographs, while above 200 km they are inferior to the latter.

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ORG: None

TITLE: "Water Radon Anomaly Fields"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 35-37

ABSTRACT: A striking aspect of water radon levels in relation to earthquakes is that before the Tangshan quake there was a remarkable synchronicity of behavior of many wells within 200 km of Tangshan. However, for many wells anomalous values persisted after the earthquake, particularly outside the immediate region of the quake. It is clear that radon may be produced by various processes; some candidates are pressure, shear, vibration, temperature and pressure, mixing of water-bearing strata, breakdown of mineral crystal structure, and the like, although it is not clear which of these are primary. It seems that a possible explanation of the persistence of the anomaly in the case of Tangshan may be that the earthquake released strain in the vicinity of Tangshan but increased it further along the geological structures involved, thus producing a continued radon buildup.

AUTHORS: Xu Xiao [6079 4801 3610], SHEN Peiwen [3088 1173 2429]

ORG: None

TITLE: "Earthquakes and Crustal Buckling"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 1, 1980 pp 38-40

ABSTRACT: Analysis of earthquakes between 1556 and the present indicates that earthquakes of magnitude 8 and above are usually accompanied by other earthquakes of magnitude 7 or 8 within 30 years, and that these second earthquakes of the pairs tend to be at distances of either 480-550 or 1100 kilometers from the earlier quakes. A clue to the cause is given by the fact that pairs of earthquakes of magnitudes 6-7 in 1966-1976 and pairs of magnitudes above 6.5 from 1800 to 1965 can be located on opposite sides of a strip running across China at a 45° angle to the meridian. Moreover tha spacing of these pairs of quakes across the strip in question is such as to divide it into even segments. This pattern suggests an explanation of the pairing of earthquakes in terms of buckling of crustal plates under pressure. The overall pattern of earthquake zones on the globe suggests a similar explanation.

AUTHORS: Various

ORG: None

TITLE: "A Small Discussion of Electromagnetic Wave Anomalies Preceding Earthquakes"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in CHinese No 1, 1980 pp 41-43

ABSTRACT: Six brief pieces on various aspects of electromagnetic wave anomalies are presented. They cover: earthquake "electromagnetic emanations"; the use of "magnetic induction information" for earthquake forecasting; electromagnetic pulse emissions as pre-earthquake indicators; the use of magnetic sensors to determine medium-wavelength field strength for earthquake prediction purposes; magnetic deviation indicators inside reinforced-concrete buildings; and a discussion of the general physical principles involved.

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CSO: 4009

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ORG: None

TITLE: "Ducted Propeller with Simplified Duct Profile (continued 1.)"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 2, Apr 80 pp 1-12

TEXT OF ENGLISH ABSTRACT: This paper includes the results of the open water tests of two systematic series of simplified ducted propeller models, i.e., JD75 + Ka 4-85 and JD7704 + Ka 4-85. The $J \sim K_T$, K_{TN}, K_Q and η_0 curves and the coefficients of the regression polynomials corresponding to these curves are given. The usual $\sqrt{B_p} \sim \delta$ diagrams are also appended.

AUTHOR: ZHANG Hongjun [1728 7703 6874]

ORG: None

TITLE: "Resistance Tests and Analysis of the Bulb-Bows for Single Screw Cargo Ship"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 2, Apr 80 pp 13-31

TEXT OF ENGLISH ABSTRACT: The results of two model resistance tests for single screw cargo ships with a block coefficient of about 0.67, with and without bulb-bows, are analyzed. Through the resolution of model resistance components it is shown that the form resistance of this kind of ship is approximately the wave resistance in value. From this, the design of bulb-bows is put forward. According to the tests of about 30 kinds of bulb-bows under different loading conditions, a corresponding formula of boundary speed is induced which may be a criterion identifying the bulb-bow effect.

In this paper the influence of particular parameters on the bulb-bow effect is also analyzed, and the reference of selecting principal parameters of bulb-bows is given.

AUTHOR: SHU Changgeng [2631 7022 1649]

ORG: None

TITLE: "An Application of the Finite Element Analysis Method in the Vibration Analysis of Ship Grillage"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 2, Apr 80 pp 32-44

TEXT OF ENGLISH ABSTRACT: Based on the general solution of differential equations for the transverse vibration of a beam and by means of the finite element method, two kinds of matrices for the vibration of beam elements, i.e., mixed matrix and stiffness matrix, are obtained and applied to the calculation of the free vibration of a ship grillage. Considering the common property of the mixed method and the displacement method, a unified method for solving the nonlinear eigenvalue problem of high order matrices with transcendent functions is presented. This method is very convenient and can avoid the loss of roots of the eigenvalue equation. By this method the difficulty in the lack of storage of the present computers for vibration analysis may be overcome.

A very close approximation between theory and experiments is shown in the calculated examples. Therefore, it may be considered that the present method is effective.

AUTHOR: ZHENG Hangyuan [6774 5887 6678]

ORG: None

TITLE: "A Theory of the Elastic Corner of a Hull Opening and Its Tests and Calculations"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 2, Apr 80 pp 45-54

TEXT OF ENGLISH ABSTRACT: A theory of a new type of corner is presented in this paper. The author has named the new corner "elastic corner" temporarily. Through photoelastic tests and calculations of F.E.M., it is verified that the elastic corner can relax the severe strain part of the corner region and reduce the stress concentration coefficient. According to the results of tests and calculations, it is shown that the stress concentration coefficient of the elastic corner is about 15 percent less than that of the ellipse arc corner.

AUTHOR: SUN Yaohua [1327 5069 5478]

ORG: None

TITLE: "On Research and Tests of the Bending Shape Coefficient of Crankshafts"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 2, Apr 80 pp 55-70

TEXT OF ENGLISH ABSTRACT: It is important to determine the coefficient of the crankshaft structure shape when calculating the diesel crankshaft strength, for it can strongly influence the accuracy of the calculated results.

On the basis of three-dimensional photoelastic stress measurement of many crank models made of epoxy resin, the bending shape coefficient of the crankshafts is researched and the satisfactory test results are also attained. These results are analyzed and compared with those of similar types at home and abroad.

By means of the mathematical method the test results are reduced to experimental formulas and curve diagrams which may be used to calculate the crankshaft strength.

AUTHOR: TIAN Guoguang [3944 0948 0342]
ZHANG Hanlin [1728 3352 2651]
ZHU Daoyuan [2612 6670 3293]

ORG: None

TITLE: "Reluctance Type Propeller Dynamometer (R.P.D.)"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 2, Apr 80 pp 71-88

TEXT OF ENGLISH ABSTRACT: The mechanical type propeller dynamometer is unable to satisfy the requirements of the automatic measurement for ship model tests. The R.P.D. is presented in this paper. In addition to the usual ship model test, it is possible to carry out test measurements for the underwater model and multi-propeller shaft model. The principle, structure and characteristics of the R.P.D. are described in this paper. In addition, the open water test data measured by the R.P.D. in the three towing tanks are compared with the results obtained by the mechanical type of dynamometer. It is shown that the performance of the R.P.D. is stable and reliable.

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SCIENCE AND TECHNOLOGY

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BRIEFS

LECTURES BY PRC SCIENTISTS--Hefei, 5 Oct (XINHUA)--In response to a call issued by Fang Yi, president of the Chinese Academy of Sciences, to help the state train talented persons, 149 scientists of the CAS's 18 research institutes in Beijing recently volunteered to deliver lectures at the China Scientific and Technical University or to teach at the university as part-time teachers. These scientists included Wu Zhonghua of the Engineering Thermophysics Institute, Huang Kun of the Semiconductors Institute, and Wu Wenju, director of the Systemic Engineering Institute. A total of 15 of these scientists will deliver lectures at the university within the later half of this year. Xu Jianming, a research fellow of the High Energy Physics Institute and Hu Buwei, an associate research fellow of the Ion Physics Institute are now teaching at the university in Hefei, Anhui Province. [Beijing XINHUA Domestic Service in Chinese 0129 GMT 5 Oct 80]

ZHEJIANG SCIENCE SOCIETY--The preparatory committee for the Zhejiang Provincial Society for studying science and scientific management was formed in Hanzhou on 8 October. Liu Yifu, vice governor of Zhejiang and chairman of the Zhejiang Provincial Scientific and Technological Committee, addressed the inaugural meeting. The preparatory committee is headed by (Liu Caisheng), vice chairman of the Provincial Scientific and Technological Committee. [Hangzhou Zhejiang Provincial Service in Mandarin 1100 GMT 8 Oct 80]

CSO: 4008

THE ABSORPTION OF SOUND WAVES IN CONCENTRATED SUSPENSIONS

Guangzhou ZHONGSHAN DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI; ZHONGSHAN UNIVERSITY JOURNAL--NATURAL SCIENCES EDITION] in Chinese No 4, Nov 77 pp 52-59

[Article by Tang Yingwu [0781 2019 0710]]

[Text] Based on McCann's theoretical work, this article considers the constributions to absorption of the dynamic interactions of particles suspended in a sound field and of the volume displacement velocity of the suspension agent relative to the particles, and, from this, the coefficient for sound absorption in a concentrated suspension and the formula for the function of dynamic interactions of particles in suspension in a sound field are derived.

I. Introduction

Research on the laws of absorption in sound waves in concentrated suspensions is practically and theoretically quite meaningful. For example, the muddy sediments on the ocean floor in terms of marine acoustic physics are a kind of concentrated suspension[1]; likewise marine acoustic absorption materials made from metallic filaments are also in a way equivalent to a concentrated suspension.[2] Research in this area has attracted many people's attention, and a lot of work has been done.[3] But in most past theoretical work, the results obtained concerning the interactions of suspended particles in the sound field have been ignored. Experiments have verified that interactions of suspended particles will occur in the sound field if the volume concentration of the suspended particles is not less than 0.8 percent.[4] Suspensions in which there are interactions of particles in the sound field are called concentrated suspensions.

Theoretical research on sound wave absorption in concentrated suspensions is comparatively rare. In 1969, McCann[5] studied the electric force interactions of suspended particles in a sound field, and improved somewhat on Urick's Theory[6]; in 1970 Duykers[7] used a relaxation model to compute the coefficient of sound absorption in a pure kaolin suspension, and his results can better explain Urick's data, but cannot explain Hampton's[6] data too well. The weakness of work done by Duykers is that the physical meaning of the two relaxation times is not clear enough, and that his formulae contain artificial assumptions.

McCann's results[5] offer a better explanation of the dependent relationship of the coefficient of sound absorption to the volume concentration of the suspension in which the volume concentration of particles is not too high (such as less than 20 percent). But when the volume concentration of the suspended particles is greater than 20 percent, there appears a certain discrepancy between the theoretical results and the experimental data, and yet this discrepancy cannot be resolved by a proper theoretical choice of value for the constant ρ. Based on McCann's theoretical work, this article considers the contributions to absorption of the dynamic interactions of particles suspended in a sound field and of the volume displacement velocity of the suspension agent (water) relative to the particles and obtains satisfactory results.

II. Physical Concepts

We hypothesize that concentrated suspension is formed by suspending pure kaolin particles in pure water (abbreviated as water in the following). In a real setting, a suspension is very complicated; there are, for example, the nonuniform sizes of the suspended particles, the irregularity of their shapes, and the probable nonhomogeneous distribution. But under a first-order approximation, a model can be used to represent the realistically complicated situation. In this model:

a) Suspension is formed by equal-sized pure kaolin spherical particles suspended in water. In the absence of a sound field, these small spherical particles exhibit equidistant cubic arrangement in water, forming a cubic lattice;

b) In the presence of a sound field, the wave line (wave-front normal) of the sound wave is perpendicular to a surface of the cubic lattice. Particles situated on the plane perpendicular to the wave line in the sound field vibrate with the same velocity and do not rotate.

This model is illustrated in Figure 1.

Particles are arranged into a cubic lattice in stationary water. Figuratively, we color the particles "black" and "white." White particles are surrounded by black and black by white. The planes of the particles perpendicular to the wave line are shaded.

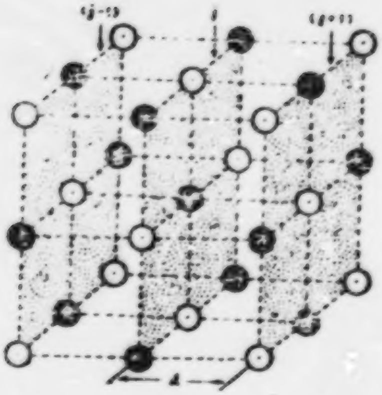

Figure 1.

From the above-mentioned model, we can observe that, in a sound field, those particles situated in the same shaded plane are in a relatively stationary state. Because there exists a difference in velocity between the suspended particles and water in a sound field, thus the "fluid flow-lines" of the black and white particles situated in the same shaded plane in a sound field will contract inwardly. That means each of the white particles will dynamically interact with the closest surrounding black particles in a sound field. Similarly, each of the black particles will interact dynamically with the closest surrounding white particles. Also, because those very small pure kaolin suspended particles carry the same kind of charge, thus there exist interparticle electric force interactions. Because the particles are arranged in the form of a cubic lattice, the interparticle electric force will not be manifested in the absence of a sound field. In the presence of a sound field, the electric force will not appear between black and white particles situated in the same shaded plane. Only between the black (or white) particles situated in the $_i$th shaded plane and the closest white (or black) particles situated in the $(_i-1)$th and the $(_i+1)$th shaded planes will significant electric force interactions be exhibited. In normal circumstances, it is sufficient to compute only the interparticle electric force interactions. These articles will exhibit significant force electric interactions in a sound field because relative displacements take place among them.

To facilitate mathematical manipulations, we compare the dimensions and wavelengths of the suspended particles. Generally, the diameter of the suspended particles of pure kaolin are about $1 \sim 3\mu$, and in suspensions, the wavelength of sound at a frequency of 1 MHz is approximately 0.15 cm (the wavelength of a sound wave in suspension is approximately equal to that in water). Therefore, in the suspensions, 1,000 particles can be accommodated in one wavelength of sound with a frequency equal to or lower than 1 MHz. This implies that, when the volume concentration of the suspended particles is larger than 1 percent, the product of the wave number k of the suspension and the distance d between the centers of the two neighboring particles is far less than 1, i.e.

$$kd \ll 1 \tag{1}$$

The validity of condition (1) greatly simplifies the treatment of the problem; for example, now the contributions to absorption from the scattering attenuation can be ignored.[4] And the chief mechanism for sound absorption in the suspension can be regarded as a viscous drag between the suspended particles and water. In the following, we shall treat the problem as if condition (1) is valid. Experiments show that condition (1) can be relaxed into (4).

$$ka \ll 1 \,, \tag{1'}$$

Where a is the radius of the particles.

III. Mathematical Description

The equation of motion[5,9] in a simple harmonic sound field for a single spherical suspended particle with angular frequency ω (omitting the time factor $e^{-i\omega t}$) is

$$m_p \ddot{x}_p = -m_l \tau \ddot{x}_u - S\omega m_l \dot{x}_u + m_l \ddot{x}_l \,, \tag{2}$$

where [10]

$$\tau = \frac{1}{2} + \frac{\delta}{4a} \frac{(2\eta + 3\eta')^2}{(\eta + \eta' + a\eta/3\delta)^2 + (\eta a/3\delta)^2} \,, \tag{3}$$

$$S = \frac{3}{4}(2\eta + 3\eta')\frac{\delta^2}{a^2} \frac{(1 + a/\delta)(\eta + \eta' + a\eta/3\delta) + (\eta/3)(a/\delta)^2}{(\eta + \eta' + a\eta/3\delta)^2 + (\eta a/3\delta)^2} \,, \tag{4}$$

$\delta = (2\eta/\rho_l\omega)^{1/2}$, η' is the viscosity coefficient of the particle, x_η is the displacement of the particle from the equilibrium position, x_u is the particle's displacement relative to water, x_l is the displacement of water, m_p is the mass of the particle, m_l is the mass of water displaced by the particles, η is the coefficient of viscosity of water, ρ_l is the density of water. Because a pure kaolin particle is hard, i.e. $\eta/\eta' \to 0$, thus, expressions (3) and (4) can be simplified into

$$\tau = \frac{1}{2} + \frac{9}{4a(\omega/2\mu)^{1/2}} \,, \tag{3'}$$

$$S = \frac{9}{4a(\omega/2\mu)^{1/2}} \left[1 + \frac{1}{a(\omega/2\mu)^{1/2}}\right] \,, \tag{4'}$$

where $\mu = \eta/\rho_l$.

Because there exists dynamic interaction among suspended particles in a sound field, this causes considerable attenuation of particle surface resistance (because water also has vibration, the mean velocity of which is greater than that of the particles), even if the vibrational velocity of particles relative to water greatly increases. Assume the incremented multiple to be ψ, then, when one considers the existing dynamic interactions of suspended particles in a sound field, the equation of motion (2) should be revised to read

$$m_p \ddot{x}_n = -\tau m_1 \psi \ddot{x}_u - s\omega m_1 \psi \dot{x}_u + m_1 \ddot{x}_1 \quad , \qquad (5)$$

Here ψ is a function of the particle volume concentration V (= $\frac{4}{3}\pi a^3 N$, where N is the number of particles per unit volume). We call this the dynamic interaction function of the suspended particles in a sound field, and in the next paragraph its expression will be derived.

Also because there exist electric force interactions among the suspended particles in a sound field, the electric force thus exerted on the particles has to be added to the left hand side of equation (5). When condition (1) is rigorously satisfied, then the expression (5) for the electric force is $k^2 d^2 \beta x_n$.

$$m_p \ddot{x}_n + k^2 d^2 \beta x_n = -\psi \tau m_1 \ddot{x}_u - \psi s\omega m_1 \dot{x}_u + m_1 \ddot{x}_1 \quad , \qquad (6)$$

where β is the interparticle electric force constant. Substituting $x_n = x_u + x_1$

$$U_0 = \frac{-(\sigma - 1 - \beta d^2/m_1 c^2)V_0}{[(\sigma + \psi\tau - \beta d^2/m_1 c^2)^2 + \psi^2 s^2]^{1/2}} \quad , \qquad (7)$$

where U_0 is the module for X_u; V_0 is the module for X_1; $\sigma = m_p/m_1$; and c is the velocity of sound in the suspension, which can be approximately calculated from Wood's formula[11]

$$c^2 = \{[(1 - V_0)K_1 + V_0 K_p][(1 - V_0)\rho_1 + V_0 \rho_p]\}^{-1}$$

In the formula, ρ_1 and ρ_p are densities for water and particicles respectively, k_1 and k_p are the corresponding adiabatic compression coefficients. McCann[5] has pointed out that, as for the ways of arrangement for the previously described particles, $\beta d^2/m_1 c^2$ satisfies the relationship

$$\beta d^2/m_1 c^2 = P V_c^{1/3}, \qquad (8)$$

where P is a constant independent of the particle diameter (approximately speaking).

When the V_c of the suspension is larger, one has to introduce the concept of volume displacement velocity of water relative to particles $W = -(1-V_c)X_u$. The second term of the right-hand side of expression (6) is a surface viscous friction experienced by each particle during multiparticle vibrations. Therefore, the particle surface viscous friction F_n per unit volume becomes

$$F_n = -NSm_1\omega\phi\dot{x}_u = NSm_1\omega\phi\frac{W}{1-V_c} , \tag{9}$$

and the total energy dissipation rate per unit volume becomes

$$\frac{dE}{dt} = F_nW = \frac{NSm_1\omega\phi W^2}{1-V_c} , \tag{10}$$

The time average $\langle dE/dt \rangle$ is then

$$\left\langle \frac{dE}{dt} \right\rangle = \frac{1}{2} NSm_1\omega\phi \frac{W_0^2}{1-V_c} , \tag{11}$$

with $W_0 = -(1-V_c)U_0$.

The total energy per unit volume of sound wave in the suspension[13] is then

$$E_0 = \frac{1}{2}\rho V_k^2 = \frac{1}{2}\rho V_0^2 , \tag{12}$$

with $\rho = (1-V_c)\rho_1 + V_c\rho_2$,

V_k is the module of the effective vibrational velocity[14] of the suspension. Therefore, since the sound amplitude absorption coefficient a induced by the viscous friction is (13)

$$a = \langle dE/dt \rangle / 2CE_0 , \tag{13}$$

substituting expressions (11) and (12) into (13), and observing (7), one can obtain an expression for a

$$2a = \frac{V_c(1-V_c)\omega}{C\rho}\,\frac{\rho_1\phi S(\sigma-1-PV_c^{1/3})^2}{(S\phi)^2+(\sigma+\phi\tau-PV_c^{1/3})^2} , \tag{13'}$$

Obviously, as $\psi \to 1$ and $(1-V_c)\rho_1/\rho \to 1$, the above expression can be simplified into McCann's result.[5]

IV. Expression for the Dynamic Interaction Function

Since we only consider the condition in which the dimension of the suspended particle is much smaller than the wavelength of a soundwave in the suspension (such that condition (1) is valid), once the arrangement for the suspended particles is given by the model, this will equate the dynamic interactions experienced by the suspended particles in a sound field to those experienced in a steady motion. Thus, according to similar analysis in the literature,[15] the formula for the vibrational velocity u of water relative to the particles, at a point midway along the line joining the centers of two particles situated on the same shaded plane, is

$$u = u'\left[1 - \frac{3}{4}\left(\frac{6V_e}{\pi}\right)^{1/3} - \frac{1}{4}\left(\frac{6V_e}{\pi}\right)\right] , \qquad (14)$$

where u' is the vibrational velocity in the "Stokes flow" at a point which is infinitely distant from the centers of the particles. Because u is the greatest vibrational velocity of interparticle water relative to the particles, the interparticle dynamic interaction expressed in (1), therefore will attenuate the vibrational velocity of water relative to the particles by a multiple of

$$[1 - \frac{3}{4}(6V_e/\pi)^{1/3} - \frac{1}{4}(6V_e/\pi)]^{-1}$$

One can then derive the expression for the dynamic interaction function ψ of the spherical suspended particles in a sound field as

$$\phi = \left[1 - \frac{3}{4}\left(\frac{6V_e}{\pi}\right)^{1/3} - \frac{1}{4}\left(\frac{6V_e}{\pi}\right)\right]^{-1} \qquad (15)$$

This result can be regarded as a generalization of the result derived in reference [15]; that is, a generalization of the situation of steady motion to cover the situation of fast vibration which satisfies condition (1). Experimental results (indirectly) will verify that this is a quite successful generalization.

V. The Determination of Constant P

In the following, Urick's experimental data will be used to determine the value of constant P. Given a frequency of 1 MHz, Urick has calculated the dependent relationship between the sound absorption coefficient and the particle volume concentration of the pure kaolin suspension, and the calculated results are shown in Figure 2. The physical parameters in the suspension are: $a = 4.70 \times 10^{-5}$ cm, $\mu = 0.01$ cm^2/sec, $\rho_1 = 1.00$ gm/cm^3, $\rho_2 = 2.65$ gm/cm^3, $C = 1.50 \times 10^5$ cm/sec, $\omega = 2\pi \times 10^6$.

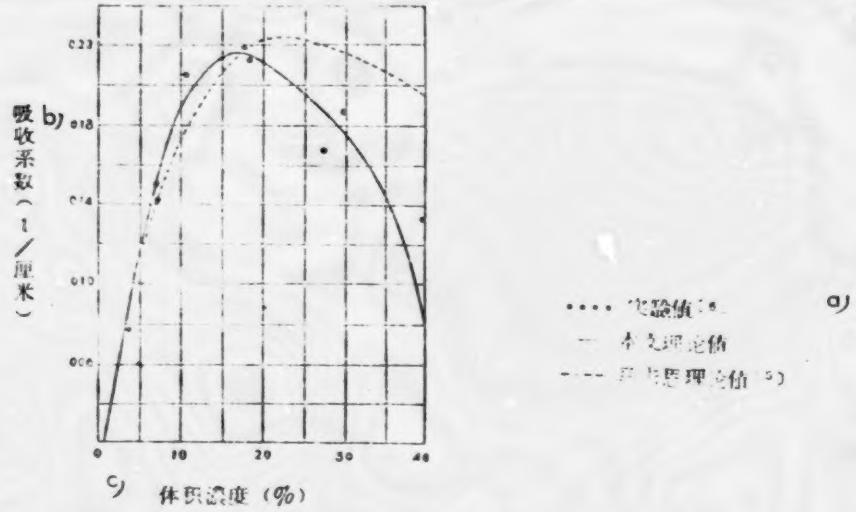

Figure 2: A theoretical and experimental comparison of the dependent relationship to a to V_c at 1 MHz (Note that in Urick's original figure the values of absorption coefficient on the vertical scale are 10 times larger)

Key:
- a)..... experimental data[6]
- —— theoretical values from this article
- ----- McCann's theoretical values[5]
- b) absorption coefficient (1/cm)
- c) volume concentration (percent)

We selected different P values together with the above parameters to substitute into expression (13') and carried out the numerical calculations. The results show that the characteristic curve for α——V_c (the solid line in Figure 2) obtained when we let P equal 0.7 corresponds to the experimental data. In this way, we have determined P = 0.7, and expression (13') can be written as

$$2\alpha = \frac{V_c(1-V_c)}{C\,\rho}\,\omega\rho_1\,\frac{\psi S(\sigma - 1 - 0.7V_c^{1/3})^2}{(\psi S)^2 + (\sigma + \psi\tau - 0.7V_c^{1/3})^2}, \qquad (16)$$

The solid line in Figure 2 is calculated by using Eq. (16). From the figure one can see that, except for the region of $V_c > 35$ percent, the theoretical results obtained in this article satisfactorily correspond to the experimental data. For the sake of comparison, McCann's theoretical results have also been presented in Figure 2 (the dotted line in the figure). Expression (1) is satisfied under Urick's experimental conditions.

VI. Comparison with Hampton's Experimental Data

The above section is to determine the constant P, and at the same time to explain Urick's experimental data. Now we compare the theoretical results obtained in this article to Hampton's experimental data.

For the situation in which the particle volume concentration is within the region $0<V_c\leqslant 0.4$ and the frequency is 1 MHz, Hampton measured the dependent relationship of the sound absorption coefficient of the pure kaolin suspension to the particle volume concentration. In the region of $10\sim 10^3$KHz, Hampton also measured the dependent relationship of the sound absorption coefficient of the pure kaolin suspension to the particle volume concentration when the corresponding volume condentrations are 30 and 37 percent. In figures 3 and 4, the black dot and the dot-dash line both represent experimental values; the solid lines represent theoretical values from this article; and the dotted lines represent McCann's theoretical values. Percentages in Figure 4 represent volume concentration of the suspended particles. The physical parameters of the pure kaolin suspension used by Hampton are

$\rho_1 = 1.00\ \text{gm/cm}^3$
$\eta = 10^{-2}\text{cm}^2/\text{sec}$
$K_1 = 4.44\times 10^{-12}\text{cm}^2/\text{dyne}$

$\rho_p = 2.71\ \text{gm/cm}^3$
$a = 1.20\times 10^{-4}\text{cm}$
$K_p = 1.00\times 10^{-12}\text{cm}^2/\text{dyne}$

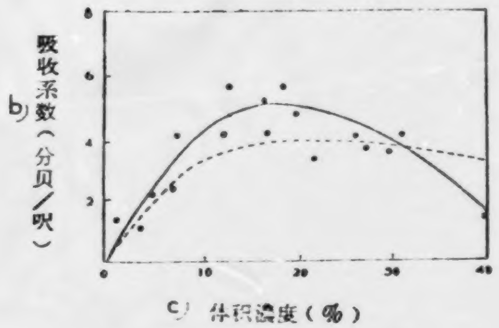

图3　频率为100千赫兹时，α 对Vc 的依赖关系，理论与实验的比较
••• 实验值[8]
a) —— 本文理论值
---- 马卡恩理论值[5]

Key:

a) ....experimental values[8]
——theoretical values from this article
----McCann's theoretical value[5]

b) Absorption coefficient (db/ft)

c) volume concentration (percent)

Figure 3. A theoretical and experimental comparison of the dependent relationship of a to V_c at 100 KHz

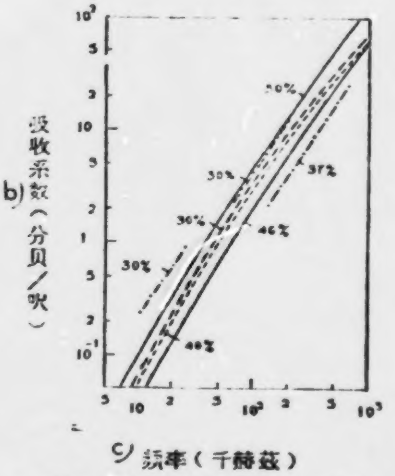

图4　α对频率的依赖关系，理论与实验的比较

a) ·–·– 实验值[8] —— 本文理论值
---- 马卡恩理论值[5]

Figure 4. A theoretical and experimental comparison of the dependent relationship of α to frequency

Key: a) ·–·– experimental values[8]
—— theroetical values from this article
---- McCann's theoretical values[5]

b) absorption coefficient (db/ft)

c) frequency (KHz)

One can see from these graphs that the correspondence between the theoretical values from this article and Hampton's data is also quite satisfactory, and that ours is better than McCann's theoretical results.

Under Hampton's experimental conditions, expression (1) is satisfied.

VII. Discussion

The P value (0.7) used by us, which was derived from Urick's experimental data, is much smaller than that determined by McCann (1.7), but our theoretical results are better than McCann's. This explains that the contributions to sound absorption in the suspensions from the dynamic interaction and the volume displacement velocity of water relative to the particles cannot be ignored. The reason that the P value determined by McCann is too large is because he relegated the absorption contribution from ψ and $(1-V_c)$ to P.

Under the condition of kd <<1, we generalize the dynamic interactions function ψ of the steady motion to the situation of fast vibration. Hampton's experiments verify that, within the volume concentration region where $0<V_c\leqslant 0.4$, this generalization is successful; Urick's experiments show that, within the region of $0<V_c<0.35$, this generalization is successful, but when $V_c>0.35$, the generalization is not valid. From the experimental circumstances, however, Hampton's data seem more reliable than Urick's. Of course, experimental research on this problem is still worth pursuging for high concentration by volume.

When $V_c>0.4$, the model of a cubic lattice arrangement of the suspended particles is no longer appropriate. In this case, one has to consider such factors as the random distribution of particles, the nonuniformity of particles, and the irregularity of shapes. Under these circumstances, to derive a value for ψ from theory will be difficult. It seems that, in determining the value in high concentration regions, one has to use the measured α data and use equation (17)

$$\phi = \frac{MS - 4\tau a n + \sqrt{(MS - 4\tau a n)^2 - 16a^2n^2(S^2 + \tau^2)}}{4a(S^2 + \tau^2)} \tag{17}$$

to calculate ψ [equation (17) is derived from eq. (16)]. In the equation,

$$M = \omega V_c(1 - V_c)\rho_1(\sigma - 1 - 0.7V_c^{1/3})^2(c\rho)^{-1},$$

$$n = (\sigma - 0.7V_c^{1/3}).$$

From Urick's experimental data (the average value of the experimental points in Figure 2) the empirical formula for ψ can be conclusively calculated to be

$$\phi = \begin{cases} 8.68V_c + 1 & 0<V_c\leqslant 0.21, \\ 16.5V_c - 0.7 & 0.21<V_c\leqslant 0.4, \end{cases} \tag{18}$$

This is the empirical formula we have ordinarily used. Numerical calculations show that expression (14) and expression (18) are the same when $0<V_c<0.35$; when $V_c>0.35$, the ψ value calculated from (14) is much larger than that calculated from (18).

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CSO: 8111/0061

BRIEFS

YUNNAN SCIENCE, TECHNOLOGY ASSOCIATION--The second congress of the Yunnan Provincial Science and Technology Association opened in Kunming on the morning of 23 September. Some 540 delegates are attending. Li Qiming, Liu Minghui, Gao Zhiguo, Zhu Jiabi, Wang Shaoyan, Yang Kecheng, Wang Qiming, Qu Zhongxiang, (Zhou Zhengyu), (Peng Bi), (Yan Jun) and (Xiao Feng), leading comrades of the Provincial CCP Committee, Provincial People's Congress Standing Committee, Provincial Government, Provincial CPPCC Committee, Kunming PLA units, Yunnan Military District and Kunming Municipal CCP and Revolutionary Committees, attended the opening ceremony. (Liu Shuzhong), vice chairman of the Chinese Science and Technology Association, and responsible comrades of the science and technology associations of Sichuan and Guizhou Provinces and Guangxi Autonomous Region, were invited to take part in this congress. (Li Lifu), responsible person of the Provincial Science and Technology Association, presided over the opening ceremony. (Zhu Ying), vice chairman of the Provincial Science and Technology Association, delivered the opening speech. (Li Yuzhong), responsible person of the Provincial Science and Technology Association, gave a work report at the congress in the afternoon. [Kunming Yunnan Provincial Service in Mandarin 1100 GMT 23 Sep 80]

LIAONING SCIENTIFIC, TECHNOLOGICAL ASSOCIATION--The second committee of the Liaoning Provincial Scientific and Technological Association held its first meeting on 25 September. A total of 111 committee members attended the meeting and elected (Guo Kexin) chairman of the committee. The meeting approved the work system for the second committee of the Provincial Scientific and Technological Association. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 25 Sep 80]

CSO: 4008

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Scanning Electron Microscopy of *Paragonimus westermani*...... He Yixun [0149 3015 8113], Institute of Parasitic Diseases, Shanghai, Chinese Academy of Medical Sciences; Ma Jinxin [7456 6855 9515], Shanghai Institute of Entomology, Chinese Academy of Sciences (148)

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AUTHOR: SHI Quishi [0670 3061 1395]

ORG: None

TITLE: "The Chu Jiao-6 Trainer Airplane"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 pp 2-3

ABSTRACT: The Chu Jiao-6 trainer airplane is a twin-seat airplane designed to train student pilots. Its preliminary design began in 1957 and it was certified by the Chinese Government in 1961 for mass production. In the Spring of this year, Chu Jiao-6 was exhibited at the Canton Trade Center and for the first time was marketed internationally. The important technical data of the Chu Jiao-6 are as follows: normal take-off weight--1400 kg; normal payload--305 kg; rated engine power--270 hp; maximum speed --287 km/hr; crusing speed--178 km/hr; actual ceiling--5200 km; maximum climb rate--3.9 m/sec; range (at 1000 m altitude)--640 km; take-off distance (paved runway)--280 m; and landing distance (paved runway)--350 m.

AUTHOR: CIU Hung [1508 4767]

ORG: None

TITLE: "Revolving Bore Gun and Revolving Barrel Gun"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 pp 6-7

ABSTRACT: The revolving bore gun and the revolving barrel gun are new aircraft guns with enhanced fire power, firing speed, and improved reliability. The revolving bore gun is used by most Western European countries; it has a firing speed of 1200-1800 rounds per minute; its structure is simple, light weight, and small in size. The revolving barrel gun was developed primarily in the United States; it has a variable firing speed ranging from 2100 to 4200 rounds per minute; its operation is highly reliable, but its structure is relatively heavy and bulky in size. In this article, the operating principle and structural features of each gun are described.

AUTHOR: ZOU Shengquan [6760 4141 6898]

ORG: None

TITLE: "MX- the Mobile Intercontinenetal Ballistic Missile"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 pp 9-11

ABSTRACT: In an effort to regain her superiority in strategic weapons, the United States has decided to develop a new intercontinental missile system called the MX. It is a high precision, 3-stage solid propellant missile to be launched from a mobile platform. It weighs 86 tons and has a throw weight of 3.55 tons; it is 21.3 meters long, 2.3 meters in diameter, and has a range of approximately 11,000 km. A number of different designs of mobile platforms have been proposed for the MX; for example, the ground based cruising platform; mobile platforms transported by highways, railroads, and rivers; the central warehouse mobile platform, the labyrinth type platform with decoy missiles; and platforms hidden in a network of tunnels. After careful analysis, the United States has selected the so-called "runway type" design which allows each MX missile to be launched from one of 23 different platforms connected by concrete tunnels.

AUTHOR: JIANG Zhou [3068 5297]

ORG: None

TITLE: "Heart, Fuel Pump, and Regulator"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 pp 12-14

ABSTRACT: On an aircraft engine, the fuel regulator is used to control the precise fuel supply to the engine which must vary continuously with flight conditions. In this article, the author points out the analogy between the function of a human heart and that of a fuel regulator. A simple experiment is described which illustrates the mechanism of a hydraulic servo motor. In addition, the operations of two particular types of fuel regulators are explained: the constant pressure difference fuel regulator, and the the simple engine speed fuel regulator. (to be continued)

AUTHOR: CHENG Zeng [4453 2582]

ORG: None

TITLE: "Supercritical Wing"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 p 17

ABSTRACT: Supercritical wing is a wing design which results in higher critical Mach number and reduces shock-induced drag at high flight speeds. In contrast to a conventional wing, the supercritical wing has a relatively flat upper surface which allows the air flow to remain supersonic without creating a shock wave over the surface. Supercritical wing design can be used to increase the cruising speed of an airplane, or to increase the range by designing a thicker wing to carry more fuel.

AUTHOR: GAN Benfu [3927 2609 4369]

ORG: None

TITLE: "A Case of Stealing Satellite Secrets"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 pp 20-21

ABSTRACT: In November 1978, an American named Canbellus was tried and convicted by the U.S. Federal Court for selling a secret document, the technical handbook for the KH-11 satellite, to the Soviet KGB. Since this incident, a number of articles have appeared in the literature discussing the reconnaissance satellites of the U.S. In this article, the author describes the main features of two specific satellites: the "Big Bird", and the KH-11. The "Big Bird" was built by the Lockheed Co., and was launched into a 184x300 km elliptic orbit with an inclination of 96.3° and a period of 89.1 minutes. It is equipped with high-resolution cameras which can send photographic information back to earth in cannisters. The KH-11 satellite was built by the TRW Co., and was placed in a 285x470 km orbit with an inclination of 96.9°. It is equipped with high resolution television cameras which can send information directly to the National Photographic Interpreting Center in Washington, D.C.; its mission time is approximately two years.

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CSO: 4009

Armaments

AUTHOR: CHU Yiqing [5969 0076 3237]

ORG: None

TITLE: "Periodic Solution of Vibration of a Two-Degree-of-Freedom Body with Dampers in which Friction Is Proportional to the Displacement"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3, Sep 80 pp 1-11

TEXT OF ENGLISH ABSTRACT: This paper studies a periodic solution of forced vibration of a two-degree-of-freedom body with friction dampers. It discusses the conditions in which the road excitation is simplified to the harmonic support motion and the friction is proportional to the displacement of the body [tank chassis]. First, we derived the differential equation of motion of system. Because of the existence of friction, discontinuous terms with sign function Sgn $(x\dot{x})$ appear in the equation, so there will be some difficulty in solving it. By means of the perturbation method we expand the solution in a power series in a small parameter ε and reduce the sign function Sgn $(x\dot{x})$ to sign function Sgn $(x_0\dot{x}_0)$ of the first approximate solution. Finally, we obtain

[Continuation of BINGGONG XUEBAO No 3, Sep 80 pp 1-11]

the nonresonance periodic solution of the system and come to some conclusions for vibrational properties.

AUTHOR: XIAO Feng [5135 1496]
WEN Shaobai [2429 4801 4101]

ORG: None

TITLE: "Acoustic Locating Techniques for the Burst Point in a Horizontal Plane"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3, Sep 80 pp 12-22

TEXT OF ENGLISH ABSTRACT: In this article, the formula for locating the burst point in a horizontal plane is developed on the basis of the assumption of the plane wave; the random error is reduced and the locating accuracy is improved by means of statistical theory and correlation analysis. Finally, the values for the correction corresponding to the original assumption are calculated.

AUTHOR: PENG Zhongji [1756 1813 0679]
WAN Daozheng [8001 6670 2973]

ORG: None

TITLE: "The Synthetic Study of Tetranitroglycoluril and Its Hydrolized Product"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3, Sep 80 pp 23-27

TEXT OF ENGLISH ABSTRACT: In 1965～1966, we synthesized a new explosive Tetranitroglycoluril and its hydrolized product 1, 1, 2, 2-Tetranitroethane (TNAE), the latter being a good intermediate to synthesize some other explosives.

TNAE is an unstable compound in H_2O, but its salts of K, Ba are stable. TNAE can react with NH_3, CH_2O to obtain Dinitropentmethylentetramine (DPT) like Methylendinitroamine.

AUTHOR: ZHANG Weiquan [1728 4850 0356]

ORG: None

TITLE: "Research on the Projectile Configurations with Minimum Drag"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3, Sep 80 pp 37-44

TEXT OF ENGLISH ABSTRACT: This paper uses the variational method to calculate the configurations of a projectile nose with the minimum drag under the conditions that the sum of nose wave resistance and frictional resistance satisfies the extremes (Euler equation). This paper also analyzes and computes numerically the optimum nose L/D (length-to-diameter ratio), secant parabolic nose and tail contraction ratio and presents the calculated curve.

AUTHOR: CHEN Qingsheng [7115 1987 3932]

ORG: None

TITLE: "Analysis of Movement of Ball Rotor"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3, Sep 80 pp 45-55

TEXT OF ENGLISH ABSTRACT: The ball rotor, as an arming and safety device, has found wide application in the fuses for small caliber projectiles used in antiaircraft, aircraft mounted and ship-based guns as well as for recoilless gun projectiles. Its main advantages are that it is simple in structure, easy to manufacture and small in volume. By means of this device we can get an arming delay if the rotational speed of projectiles is low (e.g. $\omega \approx 9000$ rpm). The problem of arming delay may be easily solved if the ball rotor device is combined with a mechanism in which the safety part is made of meltable alloy (e.g., the fuse for small caliber antiaircraft guns). It is the centrifugal moment that causes the ball rotor to rotate, so that it is only used in fuses for spin projectiles whose rotational speed is about 9000-50,000 rpm. The reliability of the function of the ball rotor and the calculations of its arming time are based on the theoretical analysis of its movement. This paper

[Continuation of BINGGONG XUEBAO No 3, Sep 80 pp 45-55]

makes a theoretical analysis of the movement of the ball rotor by means of two non-inertial coordinated systems and introduces the differential equations of the movement of the ball rotor and the calculations of its starting time. Finally, the deviation of the center of the ball rotor from the axis of the projectiles is discussed.

AUTHOR: ZHOU Lanting [0719 5695 1656]
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ORG: None

TITLE: "Behavior of Rigid-Plastic Cylindrical Shell under Explosive Loads"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3, Sep 80 pp 56-63

TEXT OF ENGLISH ABSTRACT: The behavior of rigid-plastic cylindrical shells under explosive loads has been studied as has the number solution of shell motion and stress field given in references by Odintsov and Baum. On this basis, this paper makes a further investigation and achieves an analytical solution according to the principle of energy distribution. Therefore, it is simple in calculation, compatible with real conditions and valuable to engineering application.

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General Science

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ORG: Xiangtan University, Hunan

TITLE: "W Transformation and Strong Limit for Denumerable Markov Processes"

SOURCE: Beijing ZHONGGUO KEXUE [SCIENTIA SINICA] in English Vol 23 No 9, 1980 pp 1092-1109

TEXT OF ENGLISH ABSTRACT: In this paper we present W transformation and strong limit for denumerable Markov processes. g_n transformation and strong limit for denumerable Markov processes were first introduced by Professor WANG Zikun [3769 2737 0981] who successfully solved the construction problem of birth and death processes by using the probabilistic method. Professor HOU Zhenting [0186 2182 2185] applied the g_n transformation to general denumerable Markov processes as well.

AUTHOR: HU Haichang [5170 3189 2490]

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TITLE: "On a Variational Principle in the Theory of Dynamic Stability of Elastic Systems"

SOURCE: Beijing ZHONGGUO KEXUE [SCIENTIA SINICA] in English Vol 23 No 9, 1980 pp 1110-1115

TEXT OF ENGLISH ABSTRACT: The main problem of the dynamic stability of elastic systems is to determine the boundary dividing the stable and unstable regions. This problem seems to be overlooked in the recent development of finite element methods. In the present paper, a variational principle is proposed for the critical parameter which determines the boundary dividing the stable and unstable regions. The proposed functional for the parameter has the classical form of a quotient. By this principle, many finite element methods may be borrowed simply for the numerical solution of various dynamic stability problems.

AUTHOR: None

ORG: Cooperative Research Group of Low Dose Irradiation, Institute of Biophysics, Chinese Academy of Sciences*

TITLE: "Effect of Chronic Irradiation of ^{60}Co- -Ray at Low Dose Rate on Rhesus Monkey (Macaca mulatta)"

SOURCE: Beijing ZHONGGUO KEXUE [SCIENTIA SINICA] in English Vol 23 No 9, 1980 pp 1170-1181

TEXT OF ENGLISH ABSTRACT: This paper briefly presents the results of the systematic observation of the chronic irradiation of ^{60}Co- -ray on the rhesus monkey (Macaca mulatta) at a low dosage rate. It also provides valuable experimental data on the estimation of the damage of long-term irradiation on human beings at a low dosage rate.

* Those taking part in this work are the Laboratory of Radiobiology and Laboratory of Biochemistry, Institute of Biophysics, Chinese Academy of Sciences; Occupational Department, Radiation Sickness Research Group, Third Hospital of Beijing Medical College; and Division of Pathological Anatomy, Division of Radiation Medicine, Basic Medical Sciences Department, Beijing Medical College.

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YU Yuegui [0205 2588 2710]
JI Xinquan [1323 2450 3123]
ZHANG Zuxuan [1728 4371 3551]
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ORG: ZOU, YI, WU, WANG, YU, JI and ZHAO all of Shanghai Institute of Materia Medica, Chinese Academy of Sciences; LU of Shanghai Research for Hypertension; ZHANG, a visiting investigator from the Department of Biology, Nanjing University

TITLE: "Enkephalin Involvement in Acupuncture Analgesia-Radioimmunoassay"

SOURCE: Beijing ZHONGGUO KEXUE [SCIENTIA SINICA] in English Vol 23 No 9, 1980 pp 1197-1207

TEXT OF ENGLISH ABSTRACT: Since there are several endogenous morphine-like substances differing in distribution and probably also in function, it seems

[Continuation of ZHONGGUO KEXUE Vol 23 No 9, 1980 pp 1197-1207]

necessary to study their roles in acupuncture analgesia separately. Therefore we set up a sensitive and specific radioimmunoassay (RIA) for met- and leu-enkephalin, and employed it in determining the changes of enkephalin contents in the brain regions and CSF during acupuncture. The main results are as follows: (i) Two enkephalins increase markedly in the hypothalamus and striatum during acupuncture analgesia. (ii) Prior intraventricular bacitracin enhances the acupuncture analgesia with concomitant increased contents of enkephalins in the brain and CSF. (iii) Cycloheximide, the protein-synthesis inhibitor, reduces the enkephalin-increasing effect of acupuncture, indicating that one of the mechanisms by which acupuncture elevates the enkephalin levels is the acceleration of biosynthesis. (iv) After surgical isolation of a rat hypothalamus, the effect of electric acupuncture is attenuated. This indicates that the hypothalamus takes part in acupuncture analgesia.

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CSO: 4009

Medicine

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YANG Rongfen [2799 5554 5358]

ORG: None

TITLE: "Studies on the Translation of Human Leukocyte Interferon Messenger RNA in Escherichia coli Cells"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 193-195

TEXT OF ENGLISH ABSTRACT: This paper describes the methods of obtaining and the characteristics of human leukocyte interferon messenger RNA (HLI-mRNA) translated in Escherichia coli (E coli) strain X-79 cells. The HLI-mRNA was extracted from human leukocytes which were induced by NDV to produce interferon, and E coli cells were pretreated with HLI-mRNA. Then HLI-mRNA was added in the presence of DEAE-dextran. The production of an antiviral substance in the E coli cells was shown after incubation of the cells with HLI-mRNA. Further analysis showed that: The antiviral substance produced by E coli cells was stable at acid pH 2 (treated for 24~48 hours), possessed interferon of strict

[Continuation of JIEFANGJUN YIXUE ZAZHI No 4, Aug 80 pp 193-195]

species specificity and possessed quite high titre (120~240 units/ml); unlike animal cells, E coli cells, when translating interferon, do not require pretreatment with actinomycin D. The antiviral activity of the substance can be inactivated by trypsin and is resistant to ribonuclease.

Thus, the antiviral substance produced in E coli cells in response to exogenously added mRNA-induced human leukocytes has the property of human leukocyte interferon. This procedure may provide a simple and convenient assay system for IF-mRNA and could be applied to the genetic engineering studies concerning interferon.

AUTHOR: CAI Yongzhi [5591 3938 0037]
ZHANG Baoren [1728 1405 0088]
CHEN Rukun [7115 1172 0981]
et al

ORG: None

TITLE: "Studies on the Preparation of Chinese-made Pyrolytic Carbon Tilting-Disc Cardiac Valve and Its Clinical Use"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 196-198

TEXT OF ENGLISH ABSTRACT: This paper presents the characteristic features of a Chinese-made pyrolytic carbon tilting-disc cardiac valve and its preliminary experience of clinical use. Experimental studies, both *in vitro* and *in vivo*, were carried out, and it was proved that the said valve was suitable for clinical trial. It was then implanted in the mitral position in 15 patients. Eight of the twelve survivors have resumed their original work. Three patients died of causes unrelated to the prosthesis. The present results warrant extension of the clinical use of this type of cardiac valve prosthesis.

AUTHOR: ZHANG Taihe [1728 1132 0735]

ORG: None

TITLE: "The Ultrastructural Changes and the Mechanism of Chronicity in Chronic Viral Hepatitis"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 206-208

TEXT OF ENGLISH ABSTRACT: Sixty-five cases of chronic persistent hepatitis (CPH) and chronic active hepatitis (CAH) were studied under both light and electron microscopes. The cisternae of the rough endoplasmic reticulum (RER) were dilated, the ribosomes decreased in number and even dissociated from RER surfaces. Alterations of smooth endoplasmic reticulum occurred throughout the hepatocytes, the lysosomes extensively distributed in the damaged cells, autophagosomes or autophagovacuoles and residual bodies appeared in groups in CPH as well as in CAH. Mitochondria showed irregularity in shape or density, and sometimes several megamitochondria with crystalloid inclusions in their matrix may be seen in CPH. Alterations of bile canaliculi were dilatation of lumen, swelling of microvilli, hydrops and even fragmentation. Other prominent changes were the widening of intercellular spaces and narrowing of Disse's spaces. There were many microvilli protruding into the spaces from the lateral

[Continuation of JIEFANGJUN YIXUE ZAZHI No 4, Aug 80 pp 206-208]

cell membrane of the hepatocytes. The narrowed Disse's spaces were due to hyperplasia and hypertrophy of Ito cells which produced many collagen fibers infiltrating into this space. Lymphocytes infiltrated this space and occasionally contacted the liver cell membranes closely. Liver cells often showed some degree of lytic changes. Based upon these findings, we believe that the cell-mediated immunity was the possible mechanism of injury and chronicity in chronic viral hepatitis, and the narrowing of the Disse's space due to the proliferation and infiltration of collagen fibers into the intercellular spaces may be an additional factor enhancing the chronicity of chronic viral hepatitis.

AUTHOR: WEI Yuanliang [7614 0337 5328]

ORG: None

TITLE: "Medical Treatment of Two Cases of Caisson's Disease"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 209-212

TEXT OF ENGLISH ABSTRACT: Medical treatment of two essential diving accidents was reported. The first one is an acute case of serious decompression sickness due to blow-up to the water surface. Before being blown up to the surface, the patient had spent 35 minutes at 54M. A low blood volume shock and serious decompression sickness with complete transverse spinal cord damage of T_{10} occurred. During the fourth recompression therapy to 10 kg/cm^2, intravenous infusion of low molecular dextran and plasma was given. The low blood volume was successfully improved. The patient inhaled a mixture of 18% O_2-He, and heparin and other medical treatments were used which eventually were successful. The second case suffered prolonged hyperbaric exposure for six and one-half hours resulting from underwater fouling. After receiving a proper decompression schedule, the diver safely returned to normal pressure without suffering from decompression sickness.

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GU Jingfan [7357 2529 5400]
WANG Zongyin [3769 1350 0603]
et al

ORG: None

TITLE: "The Nutritive Effects of Our Native-Produced Compound Crystalline Amino Acid Infusion Solutions"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 213-216

TEXT OF ENGLISH ABSTRACT: The nutritive effects of the parenteral crystalline amino acid solutions ("771" and "782") prepared in our laboratory were studied in rats by their nitrogen efficiency ratio (NER), net nitrogen ratio (NNR), growth weight, and improvement of nitrogen balances. It was shown that these solutions were superior to the lactalbumin hydrolysate. The "782" model was much better than "771" and was comparable to milk protein.

Clinical studies of 15 cases of various types of protein malnutrition and hypoproteinemia showed that, with the exception of two cases of liver cirrhosis, all other patients have recovered from anorexia, malaise, underweight and other

[Continuation of JIEFANGJUN YIXUE ZAZHI No 4, Aug 80 pp 213-216]

signs. The concentrations of plasma protein of some patients were markedly increased and the edema disappeared. The amount of fluid secreted from the intestinal fistula of one patient was reduced, and the wound healing was accelerated. No adverse effect was noted in any case.

AUTHOR: JIANG Xingjin [5592 5281 6930]
ZHANG Hongru [1728 3163 0320]
LIANG Zenghui [4731 1073 6540]
et al

ORG: None

TITLE: "Preparation and Evaluation of the Rapid Clarificant for Turbid Water"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 217-220

TEXT OF ENGLISH ABSTRACT: A clarificant in powder form is prepared with basic aluminum chloride and polyacrylamide as chief constituents. Salicylic acid, sodium sulfite and dolomite powder are added as stabilizer and disperser. The ordinary dose is 30 mg/l. After adding this clarificant, stir the water for two and one-half minutes and let it settle for two and one half minutes. Then, clarified water with a residual turbidity below 10 mg/l is obtained. Satisfactory clarification can be achieved when the original turbidity of the water is below 2000 mg/l, its temperature above 10°C and alkalinity above 1 mEq/l. In addition, this clarificant can remove more than 98 percent of the bacteria in the water sample.

[Continuation of JIEFANGJUN YIXUE ZAZHI No 4, Aug 80 pp 217-220]

Field tests have been carried out in 15 provinces of our country and satisfactory results obtained. To achieve successful clarification of water of low alkalinity, a small amount of alkali was added. Batches of this clarificant have been produced. Its cost is about the same as that of alum and basic aluminum chloride, or even lower as its effective dose is smaller. It can be stored at room temperature for over five years without deterioration. This clarificant is especially useful for the field treatment of turbid water, and is well accepted by the Army.

AUTHOR: YANG Genyuan [2799 2704 6678]
QI Fengju [7871 7685 5468]
MIAO Guifen [5379 2710 5358]
et al

ORG: None

TITLE: "*In Vitro* Study of Immune RNA of Guinea Pigs After Burns"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 4, Aug 80 pp 221-224

TEXT OF ENGLISH ABSTRACT: It is well known that immune RNA is able to transfer immunologic information of the humoral and cell-mediated immunity from donor cells to recipient cells, but whether the immune response developed in the convalescent stage of animal or human victims after burns can be transferred to recipient lymphoid cells by means of immune RNA is still a problem to be answered. Immune RNA was extracted from lymphoid cells of guinea pigs which were convalescing from burn injuries, and a series of tests on adoptive immunity was carried out with it *in vitro*. It was found that immune RNA is able to transfer rapidly immune responses to the lymphoid cells of normal guinea pigs. It is hypothesized that immune RNA might be used in prevention and treatment of infection and septicemia in burn patients.

9717
CSO: 4009

AUTHOR: None

ORG: Research Group for Two-Dimensional Measuring Instruments, National Institute of Metrology

TITLE: "Two Coordinates Measuring Machine with Laser Interferometer"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 81-92

TEXT OF ENGLISH ABSTRACT: A precise instrument, the two-dimensional measuring machine, has been developed which is based on determining length by means of the laser interference technique.

In this article the main construction of the machine and the four interference systems, including the basic interference system for determining the length, the interference system used for compensating for the Abbe error, the interferometer for measuring small angles and the interferometer for measuring the refractive index of air, are briefly introduced. The method of decreasing the influence of the geometrical error of guides of the instrument for testing and correcting the direction of the moving table in any time is also discussed.

[Continuation of JILIANG XUEBAO Vol 1 No 2, Apr 80 pp 81-92]

In addition, an interpolation method used for measuring dimensions and a two-dimensional-electronic touch probe are presented.

AUTHOR: SHEN Naicheng [3088 0035 3413]
WU Yaoxiang [0702 5069 4382]
SUN Yimin [1327 5030 3046]
AN Jialuan [1344 1367 7762]
WANG Chu [3769 2806]

ORG: SHEN, WU, SUN and AN all of the National Institute of Metrology; WANG of Beijing University

TITLE: "Iodine Saturated Absorption Stabilized He-Ne Laser"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 93-101

TEXT OF ENGLISH ABSTRACT: This report describes the construction and operation of an iodine stabilized He-Ne laser in NIM, and the results of the measurements of frequency stability and reproducibility. Frequency stability is about 2 x 10^{-11} (1s), 6 x 10^{-12} (10s) and 2 x 10^{-2} (100s) respectively. Frequency difference of the two lasers is determined from the measured beat frequencies averaged over components "d" to "j." Frequency reproducibility is better than ±4 x 10^{-11}.

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ZHAO Jiaqi [6392 1367 3825]
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ORG: None

TITLE: "Methane Saturated Absorption Stabilized He-Ne Laser"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 102-107

TEXT OF ENGLISH ABSTRACT: This paper describes the construction and operation of a methane saturated absorption stabilized laser in NIM, and the results of the measurements of frequency stability and reproducibility. Frequency stability is about 3 x 10^{-12} (1s) and 1 x 10^{-12} (10s) respectively, and frequency reproducibility is estimated to be ±2 x 10^{-11}.

AUTHOR: CHEN Senyuan [7115 2773 0337]

ORG: None

TITLE: "The Cross-Coupling and Parasitic Frequency-Modulating Errors in UHF or Microwave Phase Shift Measurement System"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 108-121

TEXT OF ENGLISH ABSTRACT: This paper describes the theoretical analysis of the cross-coupling and parasitic frequency-modulating errors in the twin-channel heterodyne UHF and microwave phase shift measurement system, and discusses the correct combinations of these errors in various cases.

AUTHOR: ZHANG Zhonghua [1728 6945 5478]

ORG: None

TITLE: "Some Theoretical Studies on the Problem of Superconducting Magnetic Shielding with Application to the Superconducting Current Comparator"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 122-131

TEXT OF ENGLISH ABSTRACT: The macroscopic electrodynamic characteristics of the superconductor as a static magnetic screen have been analyzed in this paper. Based on these studies a new design of superconducting current comparator with high accuracy, simple and easily realizable structure has been proposed. The error due to the existence of the necessary insulating gap of the superconducting screen was also estimated. It has been pointed out that a gap with finite depth will produce a "magnetic resistance attenuation effect" and thus the shielding ability of the screen can be improved appreciably.

AUTHOR: ZHANG Youfeng [1728 6945 5478]

ORG: None

TITLE: "A Calibration Method for the Inductive Current Divider"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 132-141

TEXT OF ENGLISH ABSTRACT: This paper describes an absolute method for the calibration of the complex current ratio of the inductive current divider and the current comparator. The advantages of this calibration method are that the external characteristics of the current divider can be calibrated under actual working conditions and the potential difference between the shields of the reference current transformer and the external connection leads will not affect the calibration results. Thus, this method will be very useful at the higher frequencies where other methods are somewhat constricted. The accuracy of this calibration method is in the order of 10^{-9} of the input.

AUTHOR: TANG Gaohua [3282 7559 5478]
LIN Dawei [2651 1129 5588]

ORG: None

TITLE: "The Precise Coulometric Titration Method in the Determination of the Purity of Sodium Carbonate"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 142-146

TEXT OF ENGLISH ABSTRACT: This paper describes the method and device of precise coulometric titration at constant current used for the determination of the purity of sodium carbonate. The conditions of measurement are stated in detail. By this method the attainable precision is 0.004 percent, and the total uncertainty is 0.005 percent.

AUTHOR: HUA Shihan [5478 1597 7281]

ORG: None

TITLE: "The Data Processing for Pressure Transducers in Dynamic Calibration --A Method of Storage-Trace for Evaluating Phase-Frequency Characteristics"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 147-151

TEXT OF ENGLISH ABSTRACT: This paper presents a storage-trace method for pressure transducers in dynamic calibration. Its special point is that the evaluation of the characteristics of the phase-frequency must be suitably modified by the results evaluated from the formula

$$\Phi(\omega) = \mathrm{tg}^{-1} \frac{I(\omega)}{R(\omega)}$$

and this modification must be based upon whether the signs of the real part of the frequency-characteristics of the two adjacent frequencies are identical or not.

The formula described is suitable for calculating by computer. An illustrative example is given.

AUTHOR: LIN Jin [2651 0513]

ORG: None

TITLE: "A Reciprocity Method for the Calibration of Standard Accelerometers"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 152-156

TEXT OF ENGLISH ABSTRACT: A reciprocity method for the calibration of a standard accelerometer and its error are discussed in detail. A comparison of calibration between the reciprocity method and the method using laser interferometer is given. The error is about ± 0.5 percent in the frequency range of 60 Hz to 200 Hz, which is the same as that in the method using the laser interferometer.

AUTHOR: HUANG Zhixun [7806 1807 3169]

ORG: None

TITLE: "Proposal of the Applications of Superconducting Circular-Waveguide Below-Cutoff"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 2, Apr 80 pp 158-160

TEXT OF ENGLISH ABSTRACT: The major advantage of the piston-attenuator is that the attenuation constant can be expressed in fundamental units, length and time. But here the finite conductivity of the material used for the waveguide produces a second-order effect on the attenuation constant, and the problem is how to evaluate or remove this effect.

The surface resistance of a superconducting material is near zero. The skin-depth of niobium is very much thinner than the skin-depth of the best conductors in the normal state. Therefore, the superconducting circular-waveguide below-cutoff (SCWBCO) is suitable for the precision piston-attenuator, i.e., the primary standard of attenuation.

9717
CSO: 4009

Nuclear Physics

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TITLE: "Study of the Fission of the Excited Nuclei Near the Radium"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 2 No 1, Feb 80 pp 19-28

TEXT OF ENGLISH ABSTRACT: The fission phenomena of excited nuclei near the radium formed from 72.5 MeV ^{12}C bombarding with ^{197}Au, $^{nat.}Pb$, ^{209}Bi have been studied by coincidence measurement of the fission fragments.

The results show that they are characterized by the dominance of the mass symmetric fission. The FWHM of the mass distributions are 26.0, 26.9 and 28.2 amu respectively. The average total kinetic energies released by the most probable fission are 159.0, 164.5 and 161.8 MeV, respectively. These results agree with those of the former experiments and the semi-empirical analyses.

[Continuation of YUANZIHE WULI Vol 2 No 1, Feb 80 pp 19-28]

They also agree roughly with Nix's theoretical calculation.

From the analyses of the average total kinetic energies released by the most probable fission, it can be shown that the fission fragments at the moment of scission are not spherical, but partly deformed.

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XU Jincheng [6079 6210 6134]
LIU Zuhua [0491 4371 5478]
et al

ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "The Dependence of Average Numbers of Prompt Fission Neutron of ^{239}Pu on Incident Fast Neutron Energies"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 2 No 1, Feb 80 pp 29-40

TEXT OF ENGLISH ABSTRACT: Average numbers $\overline{\nu}_p$ of prompt neutron for ^{239}Pu fission induced by neutron with energies from 0.1 MeV to 1.5 MeV have been measured by means of a spherical Gd-loaded liquid scintillation counter. The new homemade Gd-loaded liquid scintillator and fast current fission chamber were used in this measurement. In order to obtain the absolute values of $\overline{\nu}_p$, the neutron detection efficiency was calibrated in accordance with (n, p) scattering occurring on a stilbene crystal by collimated monoenergetic fast neutron beam. The experimental data were fitted by a least square method with a straight line $\overline{\nu}_p(E_n) = (2.858 \pm 0.015) + (0.102 \pm 0.017)E_n$.

AUTHOR: YANG Chunxiang [2799 2504 4382]
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WENG Peikun [5040 1014 3540]
et al

ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "The Decay of ^{99}Mo"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 2 No 1, Feb 80 pp 41-46

TEXT OF ENGLISH ABSTRACT: The gamma-ray spectra of ^{99}Mo radioactive decay have been studied by using Ge(Li) spectrometers. The gamma-ray energies and the relative intensities of the 14 main transitions have been measured, and the β-decay branching ratio was deduced.

AUTHOR: LIU Zuhua [0491 4371 5478]
ZHANG Huanqiao [1728 3562 0829]

ORG: Both of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "The Distribution of Prompt Neutron Numbers for Long Range α-Particle-Accompanied Fission of ^{252}Cf"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 2 No 1, Feb 80 pp 53-57

TEXT OF ENGLISH ABSTRACT: The distribution of prompt neutron numbers (P_v) and average number of prompt neutrons emitted per fission ($\overline{v}_p^{LRF}$) for long range α-particle-accompanied fission of ^{252}Cf have been measured by means of a large Gd-loaded liquid scintillation counter. The obtained distribution of prompt neutron P_v is in accordance with Gaussian distribution with $\sigma = 1.25$, and the value of $\overline{v}_p^{LRF}$ is 3.033 ± 0.020.

9717
CSO: 4009

Petroleum

AUTHOR: YE Lianjun [5509 6647 0193]
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TITLE: "Classification of Sedimentary Basins"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 1-6

TEXT OF ENGLISH ABSTRACT: Classification of sedimentary basins is akin to the purpose of investigation. Therefore, it varies a lot. Our chief interest is laid mainly upon the kind of sedimentary deposits that are relevant to the genetic history of sedimentary basins. To meet this end, we have first differentiated the temporal sequence relationship between sedimentation and basin-forming, and second have given due consideration to the genetic processes of sedimentary basins. Our scheme of classification is roughly as follows:

A. Antecedent Basins:
 A_1. Subaerial antecedent basins;
 A_2. Subaqueous antecedent basins;
B. Growth (or syndepositional) basins:

[Continuation of SHIYOU XUEBAO No 3, Jul 80 pp 1-6]

 B_1. Flexuring growth basins;
  (a) Thin crust flexuring basins;
   (1) Lavatic basin;
   (2) Eugeosynclinal basin (antecedent basin in its early stage of development);
  (b) Thick crust flexuring basins;
   (1) Platform basin;
   (2) Parageosynclinal basin;
   (3) Miogeosynclinal basin;
 B_2. Fault growth basins:
  (a) One-side fault growth basin;
  (b) Two-side fault growth basin;
C. Secondary Basins:
 C_1. Fault-subsided basin;
 C_2. Remnant synclinal basin;
 C_3. Intermontane basin.

The role of tectonics and the temporal sequence of development and evolution of various sedimentary basins are discussed in this paper. The direct driving force of basin-forming was thought to be in some way connected with local variation and displacement of subcrustal materials.

AUTHOR: SUN Zhaocai [1327 5128 2088]

ORG: The Third Reconnaissance Brigade, Ministry of Geology

TITLE: "The Tectonic Framework and Petroleum Prospectivity of Pre-Mesozoic in the Northern Part of the Eerduos (Ordos) Basin"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 7-17

TEXT OF ENGLISH ABSTRACT: When conducting oil and gas exploration in the Pre-Mesozoic in the northern part of the Eerduos Basin, it should be borne in mind that the basin was once a continental margin. Based on the structural setting in the different stages of tectonic movement, the author divides the region into five structural units from west to east as follows: the Helan fold zone, the Tianhuan synclinal zone, the hinge zone, the monoclinal zone and the Wulanger uplift.

When exploring for oil and gas in the northern part of the basin, the following poinst should be given proper attention:
1) from Ahuzishan to Majiatan, keep an eye on the structure there which is a hinge zone from a slope leading to a deep trough, and from Shanyanjing to Bujianghai fault-depression zone, on the hidden unconformity surface at the

[Continuation of SHIYOU XUEBAO No 3, Jul 80 pp 7-17]

bottom of the upper and lower Paleozoic and the Shihezi formation;
2) notice the uplift of the lower Paleozoic from Qingyang to Wushenqi and also the middle section of the Helan fold zone;
3) the possibility of the Wulanger uplift being a petroliferous buried hill.

AUTHOR: LIAO Mingshu [1675 2494 2579]

ORG: Institute of Exploration and Development of the Sichuan Petroleum Administration

TITLE: "On Log-Data Processing of Fractured Carbonate Reservoirs"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 19-32

TEXT OF ENGLISH ABSTRACT: This is a study of fractured carbonate oil and gas reservoirs, based on data from actual practice and on a geological model with both a fracture solution cavity system and a porous matrix, with particular emphasis on the different effect of the two systems on fluid flow and the resultant heterogeneity of the influx of filtrates into the pay. A more practical resistivity equation is thus derived as well as the method of finding out the porosity exponent of fractures M_2. Methods of calculating porosity and saturation of the fracture-solution cavity systems under varying saturation conditions are also discussed and are found to be useful in understanding the capability and permeability of the reservoirs, predicting oil and gas well performance and determining the gas-water surface of the reservoirs. They have been applied in some wells for demonstration and analytical purposes.

AUTHOR: HAN Dakuang [7281 1129 0562]
HUAN Guanren [2719 0385 0088]
XIE Xingli [6200 5281 4409]

ORG: All of the Scientific Research Institute of Petroleum Exploration and Development, Beijing

TITLE: "Numerical Simulation Study of Water-Flood Performance in a Stratified Oil-Wet Sandstone Reservoir"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 33-48

TEXT OF ENGLISH ABSTRACT: Based on the analysis of abundant field data, the authors have built nearly a hundred simulation models and executed the related numerical calculations. The vertical water-oil displacement in the stratified oil-wet sandstone reservoirs has been studied by analyzing the dynamics of gravitational, capillary and driving forces and the effects of main reservoir characteristics, and from the results obtained in this study interpretations of the character and mechanism of water invasion in some reservoirs in China can be made.

Simulation studies reveal the fact that there exist wide differences of the

[Continuation of SHIYOU XUEBAO No 3, Jul 80 pp 33-48]

water-oil displacement mechanism between the oil-wet and the water-wet porous media. The paper points out:

1. Regarding the effect of heterogeneity of the reservoir: Quite different characteristics of water-oil displacement can be found due to different vertical permeability distribution. In a positive rhythmic reservoir, the greater the vertical permeability difference, the faster the water channeling, the smaller the thickness of pay flooded, hence the poorer the result of development; on the other hand, in a negative rhythmic reservoir, large difference of vertical permeability will, on the contrary, give better results. The oil-wet nature of the formation makes the difference between the two cases even more prominent.

2. With respect to the mechanism of gravitational, capillary and driving forces: The relationship of waterflood performance and scaling factors of the ratio of gravitational and capillary force is found, and then the effect of the permeability and the thickness of the reservoir on the water-oil displacement is depicted.

3. Regarding the effect of oil-water viscosity ratio: On water-oil displacement it is dealt with both microscopically and macroscopically, i.e., microscopically, increase of this ratio leads to a decrease of displacement efficiency and macroscopically it tends to reduce the sweep thickness. The dominance of one over the other depends on the vertical permeability distributions

[Continuation of SHIYOU XUEBAO No 3, Jul 80 pp 33-48]

and other characteristics of the reservoir rock.

4. Increasing the production rate to within the practically possible range in a stratified oil-wet reservoir will essentially have no effect on its recovery factor.

AUTHOR: BAI Jiazhi [4101 1367 4363]
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ORG: Both of the Scientific Research Institute of Petroleum Exploration and Development, Beijing

TITLE: "Experimental Verifications on 'A New Hyperbolic Model Equation for Yield-Pseudoplastic Fluids and Related Pressure Drop Formulas'"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 49-57

TEXT OF ENGLISH ABSTRACT: Experimental works have been carried out in three respects to verify those theoretical formulas in the paper entitled "A New Hyperbolic Model Equation for Yield-Pseudoplastic Fluids and Pressure Drop Formulas." As compared with the Herschel-Bulkey model, which also contains three rheological parameters, the hyperbolic model conforms satisfactorily with experimental readings. The pressure drop formulas as derived from this model give accurate results as well as simple calculations. On the other hand, the Herschel-Bulkey model shows its incomparability quite apparently.

AUTHOR: CHENG Wenjiang [4453 2429 3068]

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TITLE: "New Types of Super-Span Pipe Bridges"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 59-72

TEXT OF ENGLISH ABSTRACT: Two new types of super-span pipe bridges are discussed in this paper. One is a suspension pipe bridge of the catenary curve type and the other is a cable stayed pipe bridge. Compared to the conventional suspension pipe bridges, they have the following advantages:
(1) provide the longest span;
(2) no necessity of winding wire systems;
(3) costs lower than of other suspension pipe bridges;
(4) good winding resistance stability and resist vibrations easily with only a few simple wires;
(5) convenient for erection and assembly, not obstructing the normal inland navigation under them.

[Continuation of SHIYOU XUEBAO No 3, Jul 80 pp 59-72]

This paper briefly describes the component configurations, model tests, design considerations and analyses, as well as erection methods, etc., of these two types of bridges.

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ORG: All of Dalian Institute of Chemical Physics, Chinese Academy of Sciences

TITLE: "The Characteristics and Dehydrogenation Reaction Properties of the Pt-Sn Catalysts Prepared by a Complex Method"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese No 3, Jul 80 pp 73-79

TEXT OF ENGLISH ABSTRACT: The Pt-Sn catalysts with the -Al_2O_3 support have been used as the catalyst for the dehydrogenation of long chain n-paraffins to produce mono-olefins.

It has been found in our investigation that the catalyst prepared by a new method to improve the interaction between Pt and Sn has higher stabilities than does that prepared by the conventional method with the same composition of Pt and Sn. In order to characterize the surface structures and the

[Continuation of SHIYOU XUEBAO No 3, Jul 80 pp 73-79]

reaction properties of these catalysts, the characteristics of two Pt-Sn catalysts prepared by different methods were studied by means of the Mossbauer spectroscopy, TPD of H_2, and reaction kinetics study of cyclohexane dehydrogenation. These experiments give the evidence that the interaction between Pt and Sn may be improved if the catalyst is prepared by the complex method. The stabilities of these catalysts are obviously enhanced and the energy of activation of dehydrogenation is much higher than that of the catalyst prepared by the conventional method. These results show that this type of catalyst will be superior to the conventional commercial Pt-Sn catalyst if it is used in the process of mono-olefin production.

9717
CSO: 4009

AUTHOR: ZHANG Yuheng [1728 5940 1854]

ORG: Department of Physics, University of Science and Technology of China

TITLE: "Theory of Optimum Designing for the Systems of Pulse Strong Magnetic Field"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 9, 1980 pp 1121-1134

TEXT OF ENGLISH ABSTRACT: After comprehensive consideration of the factors of coil, circuit and power, this article gives, for the first time, a general theory of designing a standard capacitor discharge pulse magnet (winding coil, Bitter coil or single turn coil). According to the theory, the optimum construction parameters of the magnet and the parameters of the power (i_0, $F(\alpha,\beta)$, a_2, b, L, C, N, l, S, (or d), R and I_{max}) can be calculated if only the figures of B_0, 2a, 1/2 T, λ, σ and v are given.

This article also makes a physical study of the optimum construction of a magnet.

AUTHOR: XU Jinkui [6079 6855 1145]

ORG: Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "The Total Yield and Energy Spectra of the Secondary Particles of Thermonuclear Reaction"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 29 No 9, 1980 pp 1151-1157

TEXT OF ENGLISH ABSTRACT: Starting from the basic formulism of nuclear reaction kinematics, the general expressions of the total yield and the energy spectra of the secondary particles of thermonuclear reactions in plasma with the Maxwellian velocity distribution of ions have been derived. The possibility of using the neutron and charged particles as a tool of plasma diagnostics is also discussed.

9717
CSO: 4009

AUTHOR: JIANG Zhaofu [3068 0340 1381]

ORG: None

TITLE: "Body-Temperature of Artificial Satellites"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 9, Sep 80 pp 10-11

ABSTRACT: Just as human beings maintain a constant body temperature by altering the attire during varying temperatures of summer and winter, an artificial satellite must also maintain an optimal body temperature to guarantee itself and all the instruments it carries to operate normally. This is especially important in case of manned satellites. The sealed cabin of the astronauts must be of a temperature and pressure condition suitable for them to live and work. This paper explains the need and the techniques of temperature controlof artificial satellites and space vehicles.

AUTHOR: HOU Wentao [0230 2429 3447]

ORG: Institute of Applied Chemistry, Chinese Academy of Sciences

TITLE: "Frightening Corrosion of Metals"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 9, Sep 80 pp 18-20

ABSTRACT: Although corrsion is a common phenomenon and everyone knows what it means, not very many have ever heard of the fact that the loss of steel and iron due to corrosion of equipment in the 2 countries of USA and USSR is estimated to be 40,000,000 tons a year. Of this, 10,000,000 tons are such total loss that reclamation is not possible. This amount of steel materials is sufficient to construct 1750 ships of 10,000 tons each or to build 75 railroad tracks each the length of Beijing-Shanghai Railway. The reasons for metals to corrode and techniques of controlling corrosion are discussed.

AUTHOR: WANG Guyan [3769 6253 1484]

ORG: None

TITLE: "The World of Living Things--Teachers of Designers"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 9, Sep 80 pp 22-24

ABSTRACT: Although human designers seem to be so capable as to create airplanes, submarines, and various automatic machines and they have even sent men to the moon, they, in fact, have learned a great deal from birds, animals, fishes, etc. mere creatures of the world of living things. This paper tells the stories of how wings of the dragonfly taught designers how to control wing tremor of airplanes, how the body-shape and skin structure of dolphins inspired designers to find new ways of building faster ships, how kangaroos taught designers to make wheelless cars to run on desert and undurated fields, and how mechanical principle of human joints and muscles taught designers to make the walking machine, etc.

AUTHOR: HAN Jizhang [7281 1323 3864]

ORG: None

TITLE: "New Water-Saving Equipment--Glass Steel Cooling Tower"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 9, Sep 80 p 41

ABSTRACT: In recent years, round, white, tower-like structures are often observed perched atop factories in such cities as Shanghai, Guangzhou, etc. They are new water-saving equipment made of glass steel [glass fiber reinforced plastic] for recycling and cooling the water having been used in the production process as a heat exchange medium. Although the temperature of the water is raised in the production process, the quality is unchanged. In the past, the cooling towers are made of wood, cement, or steel, with natural ventilation for cooling. The glass steel material is more resistant to rot, acids, water, alkaline, corrosion, etc. while the countercurrent type cooling mechanism is also more efficient. A drawing depicting 2 such cooling towers is included.

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END

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31 October 1980

China Report

SCIENCE AND TECHNOLOGY

No. 65

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CHINA REPORT

SCIENCE AND TECHNOLOGY

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NATIONAL DEVELOPMENTS

AIR RAID SHELTERS BECOME 'HOTELS' FOR UNEMPLOYED YOUTH, RETIRED WORKERS

Beijing BEIJING RIBAO in Chinese 23 Sep 80 p 1

[Photo caption]

The Jianguomen subdistrict office of Dongcheng District has organized 17 unemployed youth and a number of retired workers to use the underground civil defense structures as the "Jianguo Hotel." Since 28 July there has been a steady stream of customers.

CSO: 4008

FOREIGN COUNTRIES' INTELLIGENCE GATHERING DISCUSSED

Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENTS] in Chinese No 5, May 80 pp 5-7

[Article by Yang Baogen [2799 1405 2704]: "Strange Rocks in the Forests"]

[Text] The telephone rang impatiently. The officer on duty at the command post picked up the telephone.

"Sir, we have found a strange rock in this part of the firest. It can grow horns!"

"You try to bring it here as quickly as possible!"

"Yes Sir!"

After 20 minutes, a jeep stopped in front of the command post. Two soldiers carrying a thing wrapped in a raincoat stepped out of the jeep.

"Reporting in Sir!"

"Enter!"

After the two soldiers entered, they placed the thing wrapped in the raincoat on a table.

"Sir, this is the strange rock in the forest."

The officer removed the raincoat. A rock full of mud and mildew was exposed. The smell of damp soil of the forest arose.

"Where are its horns?"

"Sir, they will appear very soon."

"Turn on the radio and recorder and record all signals!"

As expected, after a while, two horns like those on a goat extended from the right and left sides of this mud covered rock!"

The radio received obviously compressed signals.

After 5 minutes, the horns retreated back into the rock.

"Hurry up and send the tape over for analysis and rush back the results. Send this thing back to the rear."

That night, the analysis report arrived. It was written: "After analysis, the content of the tape concerns intelligence of the number, time and direction of tanks, automobiles and personnel that passed through the forest region this morning. It also contains the content of conversation among several walkie-talkies in the forest area."

The thing was sent to the rear to the concerned research institute and technicians used small axes like those used by archaeologists to open it. Ah, the inside was full of various kinds of electronics equipment!

Everything was now clear. This is an

Automatic Surveillance Station.

In 1973, the United States dropped various kinds of surveillance stations of this kind over the battlefields in Vietnam. And they have also been installed along the Sino-Indian border. They are camouflaged as "rocks," "bricks," "rotten wood stumps," etc. The Soviet KGB also used similar types of such equipment to communicate with its spies at various places in the world and to gather intelligence.

This type of automatic surveillance stations consists of a power source, transmitter, ultra-differential search receiver, recorder, a control center with a microprocessor, antennae and an electrical motor for the drive antenna. To conduct surveillance over launching pads of guided missiles, the automatic surveillance station must function continuously for a long time. The energy depends upon an isotopic electrical power source. A wide frequency band is used to receive and gather all signals that it can receive. A subsonic probe is used to measure the important parameters of the guided missile. The automatic surveillance station installed along the Sino-Indian border by the U.S. Central Intelligence Agency uses plutonium-238 isotope as the electrical power source to carry out surveillance over our nation's nuclear tests and nuclear weapons. It utilizes an electromagnetic probe to probe the pulse of nuclear electromagnetism, and utilizes subsonic and seismic equipment to monitor the tests. In combat surveillance, the transmitter uses a sonic transmitter.

The entire function of the automatic surveillance station is commanded by the control center with a microprocessor. It can gather signals for long periods and then transmit all information recorded on the magnetic tape within 3 to 5 minutes. The antennae emerge when information is being transmitted. After the information has been transmitted, the antennae retreat back into the device. The large automatic surveillance stations of this type are as large as a suitcase and the small ones as small as a fist. It is different from ordinary listening devices. A listening device continuously listens and continuously transmits information. The automatic surveillance station continuously listens but transmits information in pulses.

Then, how does it

Sneak Into the Enemy's Rear?

To conduct "real time" combat surveillance and strategic surveillance, this type of automatic surveillance station has to be sent to the enemy's front, communications hub, military plants, test sites of guided missiles and nuclear weapons, military posts, airfields, government offices of various nations and especially secret agencies.

Balloons or airplanes are frequently used means to drop the automatic surveillance stations. The most effective dropping method is to use a kind of framed baloons (like a bunch of grapes). This type of balloons can continue to function even when it is partially damaged. The airplane flies to a designated location and releases the automatic surveillance station. It drops to the ground lightly by means of a parachute. The parachute is made of special nylon. It can dissolve and disappear in rain or in dew, and it will not leave any trace.

Balloons cannot drop the device from the stratosphere onto target areas far away from the borders and airplanes cannot easily fly into the region, therefore a satellite can be used. In this case, the outer shell of the automatic surveillance station camouflaged as a rock is subjected the same kind of burning and erosion as a comet in the atmosphere. This method is very effective when the target landing site is a desert or a swamp.

Of course, the device can also be placed by man. The U.S. Central Intelligence Agency once used "mountain climbers" to place the automatic surveillance stations along the Sino-Indian border. The Soviet KGB utilized diplomats and specialists to carry out spying activities. A simple "sling shot" can be used to place the small automatic surveillance station on open telephone lines, telephone cables, and secret meeting places. Cleverly camouflaged automatic surveillance stations can even be sent to national agencies and the homes of leaders as "gifts."

After the automatic surveillance stations have been installed, they will begin to gether intelligence information. Foreign spy agencies can continue to receive various types of intelligence information regarding combat strategy and war tactics, and political, economic, national and regional information.

Then, how do they

Communicate?

There are three ways of communication between the automatic surveillance station and foreign spy agencies.

If the device is placed on the border or in the front lines of the battlefield, the relay station can be carried by balloons into the air. The information transmitted by the automatic surveillance station is relayed to the spy agencies.

Or a flying vessel or an airplane can be used for periodic reception and recording of the signals transmitted by the automatic surveillance station, and the tapes are then turned over to the spy agencies.

The second method is satellite relay. The satellite flies over a certain region at a fixed time, and the automatic surveillance station under the command of the synchronous signals from the satellite transmits the information it has gathered to the satellite, and the information is then relayed to the spy agencies. The "pyramid" plan established by the U.S. Central Intelligence Agency utilizes three synchronous satellites to monitor the spy radio stations of various places of the world, and of course they include the automatic surveillance stations!

There is another method that utilizes diplomatic offices as cover to record the information from the automatic surveillance station onto magnetic tape, and the magnetic tape is sent to concerned spy agencies for analysis. This is a means frequently employed by the KGB.

The automatic surveillance station generally uses the comet trail scatter communication, ultra-short wave communication and satellite communication and such methods to transmit gathered information.

The information on magnetic tape gathered from various channels is sent to foreign spy agencies. According to reports, the KGB headquarters in Moscow has 30,000 people using electronic computers to analyze intercepted information on magnetic tapes of several miles long. At the U.S. Central Intelligence Agency, there are also 4,000 people engaged in similar work.

On the basis of normal surveillance, the United States has gained detailed understanding of the electronic systems of the Soviet Union and other nations. The numbers, positions, frequencies, time changes of radars, broadcasts, and television stations of all the places in the world have been charted. With the automatic surveillance stations, the United States has ceased to launch any more fine tuning type electronic surveillance satellites since the beginning of the 1970s.

This type of automatic surveillance station has not ceased to develop, but has become

More and More Aggressive.

On the basis of the rapid development of listening devices, the automatic surveillance station and the listening devices have combined to form a "mother and son type" automatic surveillance system. One American company disclosed this type of system. This comapny wanted to listen in on the workings of the board meeting of a competitor, and a fly was equipped with a listening device on its back and then was sent into the meeting room through the key hole while the board meeting was in session, and the automatic surveillance equipment received secret information. Modern listening devices are developing towards miniaturization and superminiaturization. A listening device can be placed in several dozen places on a woman, in her purse, hairdress, earrings, rings on the fingers, wrist watch, lapel, buttons, false teeth, and glasses. Listening devices can be made into harmonicas, "gifts," "telephones," and can also be installed in places unnoticed by people such as corners of walls and sides of houses. They can be placed anywhere. Several dozen listening devices were installed in the U.S. Embassy in the Soviet Union. They have become an important means of the cold war. An important means of bugging from superlong distances at present is the use of lasers. The laser is beamed onto glass, walls or rocks. These laser bundles will vibrate slightly when there is sound. Interference techniques are used to interact the emitting laser and the reflected laser and to extract the sound signals. Using the skills of acoustics, one can separate a person's important conversation from very confusing noises. This makes it difficult for listening devices to handle. The automatic surveillance station is used as the "mother" to gether the information transmitted by the "offspring" listening devices scattered at various places, and the automatic surveillance stations are used to communicate with the intelligence agencies. Using this method, the conversation of a nation's leader can be bugged via satellite.

Because the surveillance satellite cannot continue to carry on surveillance over a certain area, and because it covers a large area, because the selection of signals is difficult, and because the cost of launching satellites is expensive, the United States and the Soviet Union have both organically combined the surveillance systems of the air, space and ground, forming a three-in-one surveillance system. The development and use of automatic surveillance stations is an important facet of the present arms race. They have intensified the tense situation of the cold war.

This type of automatic surveillance station not only can obtain strategic intelligence, tactical intelligence, but even the private affairs, likes dislikes and the family situation of certain leaders and specialists. The information has all been obtained by foreign intelligence agencies, making the Monkey seem to have far less tricks!

Then, how can this type of automatic surveillance station

Be Detected?

The simplest way is to initiate the masses, strengthen patrol, analyze and uncover suspicious situations.

The crimes of placing surveillance devices committed by diplomats and tourists who put on a phony face of good character must be firmly exposed. Equipment of state agencies, especially the equipment used by the leaders, must be manufactured domestically to prevent infiltration of listening devices.

Besides the above methods, technical means must be used to monitor large area surveillance of important areas using the monitoring stations. Camouflaged objects of suspicious movements can be recognized by using instruments similar to mine detectors and the highly sensitive Wheatstone bridge.

In addition, by analyzing the situation of the satellites that pass through various locations, especially the electronic spy satellites like the "Big Bird" satellite of the United States and the "Universe" satellite of the Soviet Union, by monitoring the signals that they receive, and by fixing and searching operations using ground radios, the "infiltrated spies" of various places can be eliminated.

Even though the time of transmission of information by the automatic surveillance stations is short and monitoring is difficult, and they are skillfully camouflaged and are very difficult to detect, if they are carefully treated, they can be completely eradicated.

9296
CSO: 4008

BRIEFS

SHANGHAI SCIENCE ASSOCIATION--To better lead work in various fields, the Shanghai Municipal Scientific and Technological Association has set up several committees--an academic committee, a science popularization committee, an international academic exchange committee and an organizational work committee. These committees have a total of 117 members, including scientists, professors and engineers as well as cadres in charge of administrative work in the scientific and technological field. Recently the committees held their first meetings to plan their work. [OW131431 Shanghai City Service in Mandarin 1130 GMT 9 Oct 80]

CSO: 4008

'CAMAC' FUNCTION MODULE SOON TO BE MASS PRODUCED

Shanghai JIEFANG RIBAO in Chinese 18 Jul 80 p 2

[Article by Wang Mingguo [3769 2494 0948]: "'CAMAC' Function Module Developed"]

[Text] Twelve kinds of "CAMAC" functional components developed by the Shanghai Instruments Research Institute were recently subjected to joint technological evaluation by the concerned departments of the State Bureau of Instrumentation, the municipal science commission and the city instruments bureau. They will be mass produced soon. The successful development of these components has provided a new road in promoting the widespread application of computers in our nation. They have also opened up a new path of exchange of technology between our nation and foreign nations.

"CAMAC" functional components are a kind of standard equipment that helps the computer realize automatic surveying and control. With this standard equipment, various types and models of computers can versatilely adapt to various fields of applications with different demands. This kind of standard equipment began in the 1970's, and its earliest application was in the realm of nuclear physics research. Because of its strong versatility, adaptability, and standardization, and its ability to be assembled, it was widely used in the control systems of industrial processes, medical research, monitoring and maintenance of human bodily functions, environmental protection, analytical instruments, automation of laboratories, data transmission etc. At present, over 20 nations in the world commonly utilize this type of standard equipment.

The Shanghai Instruments Research Institute began in 1978 to develop this type of standard equipment. After 2 years of efforts, 12 lines of this type of equipment have been developed. Whether in design or in manufacturing technology, whether in the selective use of the original components or the external appearance, they have all been developed according to strict requirements. After testing in high temperatures, highly damp conditions and such adverse environments, and after continuously functioning for 200 hours, they have functioned well. Parts of the components were utilized by the Shenyang Automation Institute of the Chinese Academy of Sciences and the Shanghai Atomic Nucleus Institute and were proven to be reliable in quality.

At the evaluation meeting held from the 8th to the 12th of this month, representatives from the First Ministry of Machine Building, the Second Ministry of Machine Building, the Fourth Ministry of Machine Building, the Fifth Ministry of Machine Building, the Eighth Ministry of Machine Building, the Chinese Academy of Sciences, related higher educational institutions, and research units throughout the nation evaluated these products in various kinds of tests and concluded that they were up to international standard.

9296
CSO: 4008

CHINESE CHARACTER COMPUTER INPUT SYSTEM EXPLAINED

Tianjin TIANJIN RIBAO in Chinese 23 Jul 80 p 4

[Article: "Simple Chinese Character Input System for Computers Is Successfully Developed; This Is Very Significant in Popularizing the Application of Computer Technology in Various Fields in Our Nation"]

[Text] NEW CHINA NEWS AGENCY, Beijing, July 21—The Beijing Eastern Scientific Instruments Plant's technicans Zhang Linxiang [1728 3829 5046] and translator Ge Xuejuan [5514 7185 1227] have successfully developed a kind of simple Chinese coding method and a Chinese character input keyboard, providing a better Chinese character input system for our nation's application of computers. With this system, people need only to remember the numerical code of the number of strokes and the numerical code of the Chinese Pinyin (romanized spelling) of each Chinese character stipulated by the coding method. The numerical codes are input into the computer by the keyboard. The computer will then be able to automatically search for scientific and technical information, automatically compose newspaper layout, automatically carry out machine translation between various languages and automation of communications projects.

Not long ago, representatives and scientific and technical personnel and specialists from the National Defense Science Commission, the Chinese Academy of Sciences, Committee for the Reform of the Chinese Written Language and the Beijing University discussed this Chinese character input system and evaluated it highly. They all believed the successful development of this system is very significant to the popularization of the application of computer technology in the various fields and departments in our nation.

Because Chinese characters are not alphabetical, the problem of input of Chinese characters into the computer must first be solved to utilize the computer to perform work with Chinese characters. This requires that each Chinese character must be translated into a different Arabic number, and a computer keyboard that corresponds to this kind of code must be developed. To translate Chinese characters into Arabic numbers, it is necessary to design a good method of coding. This method of coding

Chinese characters and the keyboard constitute the Chinese character input system. In the past, because there were many Chinese characters, the form of Chinese characte-s was complex, and there were also many homonyms, our nation had never developed a more ideal Chinese character input system.

Zhang Linxiang and Ge Xuejuan successfully developed the "simple Chinese character coding method" using a method combining the sound and the form of Chinese characters to form a coding method. Compared to the phonetic method and the method of input of parts of characters by Chinese character codes being studied domestically and in foreign nations, this method is simple, easy to learn, easy to grasp, highly efficient in application, has few characters with the same codes, and is convenient to learn and use. People with only a middle school education can relatively skillfully grasp and use this method with only two or three days of training. The Chinese character input keyboard successfully developed by them is portable. It has 128 keys and 256 character codes. It can input Chinese characters and English directly into various types of computers without the addition of any conversion equipment.

9296
CSO: 4008

BRIEFS

REMOTE SENSING MEASURES POLLUTION--Recently an experiment was conducted in Tianjin where aircraft remote sensing technology was used for the first time in China to monitor urban environmental conditions. This experiment was organized by the Tianjin Scientific Committee and the Environmental Protection Office, and was carried out by the Remote Sensing Application Institute of the Chinese Academy of Sciences. The aircraft remote sensing experiment involved the use of many advanced sensing devices to monitor the environment over different seasonal and diurnal conditions. During the experiment, 40 monitoring flights were flown, accumulating a total flight time of over 80 hours. More than 200 pictures were taken at altitudes ranging from 3,300 to 200 meters; the pictures cover most of the heavily polluted regions of 148 square km of the city and part of the Bo Hai Bay. They were high resolution photographs showing the detailed features of each region. By analyzing these photographs and correlating them with observations made on land and at sea, the scientists will be able to reveal the major pollution sources and the conditions of damage of Tianjin City and the Bo Hai region. This information will be used for pollution prevention in the future. This experiment will be repeated during the August to September period and during the month of December. [Text] [Shanghai WEN HUI BAO in Chinese 12 Jul 80 p 2] 3012

TITANIUM DIOXIDE PRODUCTION--Beijing, 7 Oct (XINHUA)--Chinese scientists have produced pigmentary titanium dioxide--an important substance in the paper, chemical, paint and other industries--by an advanced technology used in few other countries. The production of this stable and durable pigment base is done by the plasma-heating method evolved by the Institute of Chemical Metallurgy of the Chinese Academy of Sciences. The technique was developed in the 1960's. Its advantage is that it produces high-quality titanium dioxide and causes no pollution. Cooperation with a Tianjin chemical works, said a member of the institute, accelerated the experimentation of the technique at a pilot plant with an annual capacity of 300 tons. During the experiment, the institute helped the chemical works train technicians and workers, thus paving the way to mass production. There are large deposits of ilmenite, an oxide of iron and titanium from which titanium dioxide is made, in Sichuan Province, southwest China. [Text] [Beijing XINHUA in English 0737 GMT 7 Oct 80 OW]

CSO: 4020

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

NEED TO ESTABLISH RESEARCH DEVELOPMENT CENTER REITERATED

[Beijing GUANGMING RIBAO in Chinese 1 Aug 80 p 4

[Article by Zhou Jijong [0719 1376 0022] and Cheng Changye [7115 2490 8518]

[Text] What is called Research and Development is a scientific research link which transforms the results of applications research into direct production capacity by passing through intermediate testing, extended testing and production testing.

In comparison with basic research and applied research, the gap between our country's research and development and that of industrially developed countries is even greater. For example, in 1977, of the applied scientific research achievements of the Chinese Academy of Sciences, only 14 percent attained extended status, only a small portion of the applied research achievements were converted into direct production capability, while many foreign countries frequently are able to promote new technology, new crafts and new products into production every 3 to 5 years. Some countries' ratio of basic research, applied research and research and development has reached 1:2:6.

The history of modern industrial development tells us that regardless of whether a nation is developed or developing, a key to the realization of industrialization is the strengthening of the industrial research and development capability to form the central pillar of digesting imported technology, and the accumulation of the nation's technological development and production capacity.

Although China has 1,000 or 2,000 scientific research agencies in the industrial sphere, the majority of the research units are weak in technological capability and their scientific research facilities are backward. Compared with their burden of solving the thousands of product and technological problems of several tens of thousands of manufacturing and mining enterprises, it is obvious that their strength is fragmented and that they have the will but not the strength. Inasmuch as the scientific research agencies of many production departments lack the direction and assistance of an authoritative scientific research institute with respect to scientific research operations, organization, and management, achievements in scientific research have run their course on their own. In the agencies there also exist such deficiencies as "small and complete" and overlapping. To discuss only testing, a problem existing generally is the weakness of the intermediate testing link. In our country there are very few research institutions which have a significant intermediate testing base. Because the intermediate testing link is inadequate, the scientific-research-to-production cycle is dragged out, the characteristics of the research achievements are unstable, technology lacks excellence, and it is difficult to convert scientific research achievements into direct production capacity.

We consider that establishing research and development centers is a powerful measure to turn around this backward and passive situation. It is an urgent task in the development of our country's science and technology. The primary mission of such research and development centers would be: to establish a solid base for intermediate testing, extended testing, and production testing, forming a complete scientific-research-to-production system; controlling the direction, topics and dissemination and digestion of achievements of the research and development of production departments to introduce technology; to be responsible for intelligence and analysis of research and development internally and abroad as well as for investigation and research in industrial conditions and research topics; to be responsible for evaluating the intermediate test projects of scientific research units of the production departments, such as the results of the application of a research item, is there sufficient probability of [its use in] industrial production, what is the outlook, the advantages and disadvantages of introducing technology versus our own research, and so on; to establish a set of procedures and policies for levels of responsibility, levels of evaluation, levels of promotion, levels of awards, and so on with respect to achievements in scientific research; to stimulate and coordinate scientific research activity among production departments, and so on.

Research and development centers can be expanded and refined step by step on the basis of need and actual conditions, or as the state provides capital for establishment, or as assumed by a certain research institute among various types of production departments which first achieves the [appropriate] scale.

There are three questions here which are worth attention: when selecting foreign technology for introduction, the introduction of "suitable technology" should be considered adequately, that is our nation's resources, natural conditions, capital, employment of the population, the state of industrial development, and other similar elements should be considered, and "advanced world levels" should not be blindly pursued;

it should become the department's scientific research unit's pattern for carrying out scientific research contract policy, with the enterprise and the research institute signing a contract specifying explicit technological responsibilities and economic responsibilities; and the primary effort should be placed on the propagation of new technology which can take effect in the near term.

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CSO: 4008

FIRST NATIONAL METASCIENCE RESEARCH SOCIETY FOUNDED IN BEIJING

Beijing GUANGMING RIBAO in Chinese 1 Aug 80 p 4

[Article by Jin Liangjun [6855 5328 3182], Xing Tianshou [6717 1131 1108] and Qiu Hongxun [6726 3414 8113]]

[Text] The Beijing Metascience and Research Society was founded recently. This is China's first metascience research society and is an academic organization for the mass development of scientific studies and scientific development management studies in the Beijing area.

In recent years, metascience research workers in the Beijing area, along with scientific research management workers, have actively studied, conducted research, and promoted scientific studies in an effort to probe the theory and methods of modern scientific management. Earnestly investigating the history and current state of metascience abroad, information workers in natural sciences, social sciences and technology actively proceeded with the research achievements of the scientific studies of all nations, endeavoring to translate research material in metascience, writing articles on metascience, and assembling our country's research in practical and developmental metascience. The Beijing Technological Economics and Management Modernization Research Society and the Beijing Natural Dialectical Method Research Society also jointly sponsored a metascience chair. Nearly 100 organizations have established metascience research groups at various times.

The mission of this research society is: To develop research in metascience and scientific research management, to disseminate knowledge of metascience to managers of science and technology and workers in scientific and technology, to furnish opinions in response to inquiries related to policy on science and technology as well as to the management of science and technology to scientific and technological departments, to translate and publish literature and information on metascience, and to develop academic exchanges in China and abroad on metascience and the management of scientific research.

At the meeting establishing the research society, the vice chairman of the National Defense Scientific and Technological Commission, the famous scientist Qian Xuesen [6929 1331 2773], delivered an academic report: "The Management of Science and Technology and Scientific Studies," which was welcomed by the over 1,000 persons at the meeting. The vice chairman of the Beijing Municipal Scientific Committee and vice chairman of the Municipal Science Association, Tian Fu [3944 1133], also spoke.

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CSO: 4008

AUTHOR: LI Xueguo [2621 1331 0948]

ORG: None

TITLE: "Black Box--the Witness of Airplane Accident"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 5, May 80 pp 6-8

ABSTRACT: The so-called "black box" is a flight recording instrument on an airplane designed to record various technical data during a flight. These data can be used to provide post-mortem analysis of the sequence of events that occurred in case of an airplane accident. In this article, the basic operating principle of a black box is explained. The design criteria for ensuring the survival of a black box during a crash are discussed. The historical development of the black box and the evolution of its recording instruments over the years are reviewed. In conclusion, the application of modern electronic and computer technologies in the design of new recording systems for the black box is also discussed.

AUTHOR: ZHANG Zhifang [1728 1807 2455]

ORG: None

TITLE: "A New Aircraft Material --Heat Resistant Titanium Alloy"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 5, May 80 pp 12-13

ABSTRACT: Heat resistant titanium alloy is a new material which has two important properties: 1) high mechanical strength at elevated temperatures; and 2) good thermal stability (i.e., good plastic characterisitics) under varying temperature conditions. After 20 years of research and development, technologies now exist to produce titanium alloys which can withstand temperatures from 500° C to 650° C. Most heat resistant titanium alloys are used on compresser blades of an aircraft engine. They are also being considered for other applications such as surface skin of supersonic airplanes and engine housing.

AUTHOR: SE Ji [1835 0370]
YU Nong [5148 6593]

ORG: None

TITLE: "Passive Interference"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 5, May 80 pp 16-17

ABSTRACT: Passive electronic interference is an important offensive as well as defensive measure in modern warfare. The commonly used passive interference devices include metallic chaff, angular reflectors, decoys, microwave absorption materials, and ionized suspended particles. Basically, passive interference is used in the following military operations: 1) protecting aircraft in penetrating enemy defense; 2) protecting warships and covering fleet activities; and 3) assisting the penetration of warheads of intercontinental ballistic missiles during re-entry.

AUTHOR: WANG Chih [3769 4460]

ORG: None

TITLE: "Space Photography"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chines No 5, May 80 pp 18-20

ABSTRACT: Space photography has a wide range of applications: 1) military reconnaissance; 2) monitoring earth resources, weather conditions, and environmental pollution; 3) interplanetary exploration; 4) collecting engineering information on spacecraft performance; and 5) constructing lunar map. The types of imaging devices used in space photography include: panoramic-view cameras, mapping cameras, short film television cameras, three-dimensional cameras, and special purpose devices such as multi-spectrum and infrared cameras, and X-ray telescopes, etc. Because of its special mission, a space imaging device must be designed to operate under conditions of severe mechanical stress, high vacuum, severe temperature variations, and intense radiation. To achieve good pictures, astronauts must receive thorough training in photography and in the operation of space photographic equipment.

AUTHOR: KUNG Fanping [1313 0416 1627]

ORG: None

TITLE: "Space Observation Platform"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 5, May 80 pp 24-26

ABSTRACT: In July 1972, the United States launched the first Earth Resource Technology Satellite (ERTS-1) into orbit to monitor and photograph various activities on earth for the purpose of agricultural and forestry development, geological survey, water resource development, and water pollution control. At the present time, a second generation earth resource satellite system (ERTS-D) is being planned which will have superior sensor system with "theme detection and mapping instrument", relay satellite to provide real-time data processing, and the use of global positioning system to improve measurement accuracy of image regions. The Goddard Flight Center and the General Electric Co. are also developing concepts for future space observation platforms: they include: 1) an earth monitoring satellite network; 2) earth synchronous synthetic aperture radar; 3) advanced ERTS system; 4) thermal inertia measuring system; 5) radar holographic imaging device; 6) satellite with microwave capabilities; and 7) elliptic sensing device with a dual transmit-receive radar system.

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CSO: 4009/218

Chemical Engineering

AUTHOR: YU Guocong [0151 0948 3827]
YANG Zhicai [2799 1807 2088]
GU Fangzhen [7357 5364 3791]

ORG: All of the Department of Chemical Engineering, Tianjin University

TITLE: "The Steady Characteristics of Packed Column for Close-Boiling Fractionation"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 109-116

TEXT OF ENGLISH ABSTRACT: The first part of this paper is concerning the optimum reflux ratio of a packed column for close-boiling fractionation. A correlation is proposed to find the NTU at finite reflux and from which a graph representing the optimum reflux ratio is derived. It is found that the maximum value of the optimum reflux ratio is about 1.4 R_m.

The second part of this paper is concerning the optimum ratio of column diameter to packing size. Experimental work has been conducted with four laboratory columns of 20, 28, 32 and 44 mm in diameter respectively, the height of the packed bed ranging from 1020 to 1475 mm, the packing used being 2.5 x 2.5 mm angular helices and the testing system to be n-heptane--methylcyclohexane. The true separation efficiency (i.e., true HTU or true NTU per meter of bed height) is evaluated from the experimental composition profile by discarding the end effect at the top and bottom ends of the packing. By plotting the true separation efficiency versus the ratio of the column diameter to packing size, all the curves at constant vapor velocity exhibit an optimum reflux ratio with nearly identical values. The optimum reflux ratio for this packing is found to be 13-14, which is in rough agreement with that for the ordinary or industrial size of packing.

[Continuation of HUAGONG XUEBAO No 2, Jun 80 pp 109-116]

AUTHOR: JIN Yong [6855 8673]
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TITLE: "A Study of the Pagoda Type Vertical Internal Baffle in Gas-Fluidized Bed"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 117-128

TEXT OF ENGLISH ABSTRACT: A new type of internal baffle has been developed for the purpose of improving the performance of gas-fluidized beds. The fluidizing behavior of the new pagoda type baffles has been studied in a two-dimensional bed in comparison with those of other types, and both photographs and moving pictures have been taken to demonstrate their viability in breaking up bubbles and enhancing gas-solid contact.

The pagoda baffles installed in a 30-cm diameter pilot plant fulid-bed reactor for manufacturing phthalic anhydride from catalytic oxidation of naphthalene

[Continuation of HUAGONG XUEBAO No 2, Jun 80 pp 117-128]

have been found to increase the feed load from 50-100 to 100-160 grams per hour per kilogram of catalyst as compared to horizontal baffles originally used in the same reactor, corresponding to an increase in duty of 50 to 100 percent.

The experimental data has been treated with a two-phase model. Results show that a fluidized reactor with pagoda internal baffles has a very high interchange coefficient between the bubble phase and emulsion phase.

AUTHOR: FAN Zheng [5400 2973]
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CHEN Jiayong [7115 1367 6978]

ORG: All of the Institute of Chemical Metallurgy, Chinese Academy of Sciences

TITLE: "Studies on Gas-Lift Gas-Liquid-Solid Three-Phase Reactor"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 129-142

TEXT OF ENGLISH ABSTRACT: Studies were made on certain characteristics of a gas-lift reactor. This type of reactor is called a Pachuca tank in hydrometallurgy and is used widely as a gas-liquid-suspended solid particles three-phase reactor. Methods were developed to calculate gas-liquid and gas-liquid-solid particles circulation capacity through the central tube of the reactor based on the energy balance principle. Starting from the force balance on a solid particle, equations with dimensionless groups were also developed to calculate the critical settling velocity of particles at the reactor bottom. Based on experimental results, the critical plug-up velocity of the reactor can be calculated by an equation developed. Results can be used for the design and operation of this kind of reactor.

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TITLE: "Mathematical Model of Zone Method in Calculating Radiating Heat Transfer and Its Application in Box or Cylindrical Furnace"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 143-164]

TEXT OF ENGLISH ABSTRACT: A mathematical model using the zone method to calculate radiating heat transfer is described. In the zone method, the system is divided into surface zones and gas zones, the number of which depends on the accuracy of results desired and calculation time required. The temperature profiles in a furnace are obtained by solving simultaneously energy balances in each zone. As originally developed by Hottel and Cohen, the direct exchange areas are limited to cubes and squares. In this paper, the derivation of the direct exchange area equations is extended between any two zones in the box or

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cylindrical furnace. These equations are adaptable to any dimension of rectangles, coaxial cylinder walls, end rings and other shapes.

A design method for the primary reformer of hydrogen production units and cylindrical furnaces is proposed. By considering the reaction kinetics, convective heat transfer and pressure drop inside the tubes, the zone method has been adopted to predict temperature profiles of process gas, furnace gas, tube surface and refractory surface in such furnaces. Results of calculation agree well with data obtained from commercial units.

AUTHOR: ZHENG Chi [6774 3589]
YING Xugen [5391 1776 2704]

ORG: ZHENG of the Shanghai Design Institute of Chemical Industry; YING of the Shanghai Institute of Chemical Technology

TITLE: "Calculation of Vapor-Liquid Equilibrium Data from Excess Thermodynamic Properties"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 165-172

TEXT OF ENGLISH ABSTRACT: Starting from non-isothermal excess enthalpy data (two or more than two sets) and isothermal vapor pressure data (one set), and based on the principle of corresponding states of solutions, a complete computation procedure of vapor-liquid equilibrium data is proposed:
(1) calculation of excess enthalpy $\hat{H}^E$, based on the principle of corresponding states of solutions;
(2) calculation of Gibbs free energy $\widetilde{G}^E$ or its Q function;
(3) calculation of bubbling point;
(4) calculation of vapor-liquid equilibrium data.

The computation results for benzene-cyclohexane, benzene-n-hexane, benzene-n-

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heptane, benzene-n-octane, carbon tetrachloride-benzene, carbon tetrachloride-cyclohexane and carbon tetrachloride-n-heptane, compared with the corresponding vapor-liquid equilibrium experimental data are quite satisfactory. The proposed computation procedure is appropriate to non-polar and slightly polar binary systems under relatively low pressures.

AUTHOR: GUO Tianmin [6753 1131 3046]
ZHONG Yinzhu [6945 6892 2612]
LI Zaicong [2621 0375 3827]

ORG: GUO of Huadong Institute of Petroleum Technology; ZHONG of the Computing Technique Research Institute of Shanghai; LI of Gaoqiao Chemical Plant of Shanghai

TITLE: "The Application and Comparison of Four Activity Coefficient Models in Vapor-Liquid Equilibrium and Distillation Calculations"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 173-190

TEXT OF ENGLISH ABSTRACT: The four well-known activity coefficient models (Wilson, NRTL, McCann and UNIFAC), coupled with the virial equation and tri-diagonal matrix method, have been successfully applied to the vigorous computation of various non-ideal distillation processes. The NIDISTL program developed by the authors has been tested on 33 distillation systems, with more than 100 calculations performed.

To make a parallel comparison of these activity coefficient models, 18 sets of binary vapor-liquid equilibrium data were chosen, and each set was fitted to the

[Continuation of HUAGONG XUEBAO No 2, Jun 80 pp 173-190]

Wilson, NRTL and McCann equations respectively by using the non-linear least square technique. The binary parameters so determined were used to predict the bubble point equilibrium data of 18 binary and 8 derived multicomponent systems. The predictions of four models were compared with experimental data.

To illustrate the consistency of distillation calculation results using different activity coefficient models, four examples are presented. The temperature, flow rate and composition profiles calculated are compared and the cause of discrepancy in some cases is discussed.

AUTHOR: XU Zhong [1776 1813]

ORG: Department of Power Engineering, Xi'an Jiaotong University

TITLE: "Pseudocritical Constants for Nonpolar Mixtures"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 2, Jun 80 pp 191-200

TEXT OF ENGLISH ABSTRACT: With the aid of fundamental correlations of statistical mechanics and some assumptions, a simple method for calculating pseudocritical constants of mixtures containing nonpolar and slightly polar components is proposed in this paper. A detailed comparison of pseudocritical constants by this method with those by Lee-Kesler's rule has been made. Finally, using this method together with Lee-Kesler tables, compressibility factors for some gas mixtures have been calculated, obtaining good agreement with experimental data.

9717
CSO: 4009

AUTHOR: GUO Zuyuan [6665 4371 3293]

ORG: None

TITLE: "Opinions Concerning Regionalizing and Comprehensive Treatment and Control Plan of Urban Liquid Waste"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 pp 1-3

ABSTRACT: In order to reconstruct the old cities into modernized socialist clean cities, pollution of urban liquid waste must be eliminated. Pollution control and environmental protection must be combined with production development. The author suggests: (1) Economic losses from environmental pollution and waste of resources created by the liquid waste of each region must be surveyed and clarified. (2) The cost of investment and the economic benefits for controlling the source of liquid waste in the upper reaches of each district of the liquid waste system, constructing the coordinated engineering projects in the lower reaches of waterways must be clearly calculated. (3) Technical and economical comparisons must be made for selecting the plant site and treatment measures for treating urban liquid waste of each district. (4) The economic benefits and the optimal formula for urban liquid waste treatment and comprehensive utilization of each district must be derived. It is the opinion of the author that construction can proceed when the dual objectives of production increase and pollution control can be reached simultaneously.

AUTHOR: None

ORG: None

TITLE: "China Society of Environmental Science Determined Its Work for 1980"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 p 3

ABSTRACT: On 22-23 Dec 80, the second meeting of the Standing Committee of China Society of Environmental Science was held in Beijing. Since the establishment of the society in previous March, a great deal of work of organization and international scientific exchange had been accomplished. The committee resolved that in 1980, 3 branches of environmental engineering, environmental management, and protection of nature should be established. The 22 members of the committee also resolved that in 1980: (1)there should be a first stage of all out propaganda of methods of environmental protection; (2) there should be studies on such strategic subjects as environmental planning, energy source structuring, utilization of resources, bionomic balance, etc. (3) Emphasized development of studies on environmental economics, environmental law, and other subjects relating to environmental management; (4) the work of organizing and constructing the society must be continued.

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CHEN Bingheng [7115 4426 5899]
YANG Youming [2799 1635 2494]
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ORG: None

TITLE: "Environmental Pollution and Genetics"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 pp 13-15

ABSTRACT: Since the liberation, a great deal has been accomplished with regard to health protection of women and children, many diseases of the newborn and children have been eliminated, and the infant mortality rate is reduced from the 26.11 percent of 1952 to 8.01 percent of 1978, surpassing the level of advanced countries. Yet, incidence of congenital heart disease and congenital deformity has risen from 8.4/10,000 and 5.6/10,000 of 1952 to 15/10,000 of 1978 for both conditions. With the development of medicine in China and effective control of many infectious diseases, death due to congenital deformity has become more noticeable and a majority of these cases are related to chromosome aberration or abnormal genes, while these abnormalities are closely related to environmental factors. The paper proceeds to explain the actions of environmental pollutants on heredity. This paper is to be continued.

AUTHOR: WANG Jinghua [3769 2529 5478]

ORG: None

TITLE: "Action of River Sediments in Pollution"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 pp 18-20

ABSTRACT: At present, when pollution condition of streams is being studied, the technique of direct determination of contents of pollutants in the water is mostly adopted, while a study of the sediments of the river is often neglected. This paper explains that sediments include permanent sediments and momentary sediments. The 2 types are of different characteristics and scale, but they are both created under the same dynamic condition. The current contents of pollutants in the sediments basically reflect the current condition of pollution of the river. Sediments in the river bed are divided into layers; therefore, a study of the contents of sediments of different layers may also reveal the history of pollution of a particular stream. A study of sediments may also resolve such problems as the action of sediments in adhering, absorbing, and decomposing the pollutants. These are very profound problems and should be included in the overall evaluation of pollution of a stream.

AUTHOR: XIANG Boqin [0686 4102 3830]

ORG: None

TITLE: "Smog of Electricity"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 pp 23-25

ABSTRACT: With the birth of electronic industry, a revolution in industrial production has occurred, yet the electromagnetic energy produced by the electronic marvels can also damage the environment. The high frequency, microwave instruments used in industrial production, medical therapy, and scientific research, the broadcasting machines and antennas, the television transmission towers, the interconnection among electronic computers, the electric wave sent out by the communications satellites, and the microwave ovens in homes are constantly emitting electromagnetic waves of different frequencies and energy levels. Electromagnetic waves can interfere with television and radio reception, affect the control of artificial satellites, and cause automatic control devices and high speed electrical motors to make mistakes, and may also attack men and animals. This paper explains the nature of electromagnetic waves, their effects on environmental pollution, and possible measures for preventing the effects of electromagnetic waves on the environment.

AUTHOR: CHEN Fucheng [7115 1788 2052]
LI Zhiqiong [2621 1807 8825]

ORG: None

TITLE: "Organic Complex Fertilizer--Ammonium Humic Phosphate Made From Brewer's Liquid Waste"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 pp 36-38

ABSTRACT: The yellow liquid waste of the process of making Chinese white wine and the clear liquid precipitated from the waste of the process of making brewer's yeast contain humic acid, reduced sugar, phosphorus, nitrogen, potassium, nucleic acid, etc. and can be used as the raw material to make an organic fertilizer,very effective for improving various types of thin soils. This paper gives the chemical analyses of both types of liquid wastes and the process of using them to manufacture ammonium humic phosphate.

AUTHOR: SHEN Yingpeng [3088 5391 7720]
LAN Shucheng [5695 3219 3397]

ORG: None

TITLE: "Medium Sized Experimental Instrument for Deep Treatment of Liquid Waste of Oil Refining Process Has Been Certified"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 p 29

ABSTRACT: The cooperative research by the Dongfang Oil Refinery of Yanshan Petrochemical Company, Qinghua University, Beijing Municipal Instituteof Environmental Protection Research, and Wushun Institute of Oil Refining Research of the Ministry of Petroleum has succeeded in producing a medium sized instrument for deep treatment of the liquid waste of the oil refining process. A technical certification conference was called in Dec 79 in Beijing. The instrument includes 2 parallel systems: an activated charcoal absorption system and an ozone oxidizing system. Both systems are briefly described. The conference resolved that supplemental experiment is needed because of the change of the quality of the water, but the ozone generation system, and the structure and work process of the ozone system are ready for application and extension.

AUTHOR: None

ORG: Beijing Dongfanghong Oil Refinery

TITLE: "Water Conservation and Pollution Reduction"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 1, 80 pp 39-40

ABSTRACT: While developing production, improving the quality of the products, and increasing the number of products, Beijing Dongfanghong Oil Refinery strengthened industrial management at the same time to improve year after year the energy consumption and environmental protection problems of the refining process. Every year, the procedure of cyclic use of water has been expanded and the measure of reuse purified waste water perfected. After years of efforts, the rate of pollutant discharge has dropped and the quality of the waste water discharged has been made better. This paper describes the methods adopted by the refinery to save the quantity of water it uses and to reduce the wastes it discharges.

6248
CSO: 4009

AUTHOR: XU Xieqing [6079 0588 1987]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "A Method for the Solution of Free Surface Gravity Flow by Finite Elements"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 1-13

TEXT OF ENGLISH ABSTRACT: Among the difficult problems in hydraulics is the flow with a free surface because, not known a priori, it has to be determined as a part of the solution. A finite element method based on the variational principle for variable domains is proposed for this type of problem. As shown in the figure, the domain of solution is divided by a prescribed Γ curve into two sub-domains, the fixed ABEPQGMNOA and the variable EFQPE with the free stream line as its boundary. Triangular elements and linear distribution of ψ are adopted for the inner region, while trapezoidal elements and linear distribution of q^2 are adopted for the variable domain. The unknowns to be solved for are the values of ψ of the nodes and the ordinates of points on the free surface. Equating the partial derivatives of the functional to zero

[Continuation of SHUILI XUEBAO No 1, Feb 80 pp 1-13]

furnishes enough equations, thus the location of the free surface and the values of ψ are solved for simultaneously. The method is applied to free surface sluice gate flow over spillways and the computed pressure distribution agrees satisfactorily with experimental results.

AUTHOR: WANG Wenshao [3769 2429 7300]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Strength, Liquefaction and Failure of Saturated Sands During Cyclic Loading"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 14-27

TEXT OF ENGLISH ABSTRACT: The problem of strength, liquefaction and failure of saturated sands has always been of great concern in dealing with the safety of foundations of hydraulic structures and earth or earth-rock dams against earthquake action. This paper gives some criteria and methods for their evaluation. The theory of limit equilibrium has been used as a criterion to evaluate the incipient failure condition of the saturated sands under cyclic loading and corresponding laboratory tests and analytical methods are suggested. The distinction between liquefaction and incipient failure has been clarified. In addition, a preliminary scheme of open-type effective stress dynamic analysis method is proposed. Finally, subjects for further investigation are mentioned and the importance of preventive measures to avoid liquefaction and failure of saturated sands is emphasized.

AUTHOR: None

ORG: Laboratory of Photoelasticity, Hydraulic Engineering Department, Qinghua University

TITLE: "The Research and Practice of Abdomen Arch Dam"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 28-44

TEXT OF ENGLISH ABSTRACT: A brief introduction to several kinds of Abdomen Arch Dams, a new type of concrete dam, is presented in this paper. Abdomen Arch Dams have been suggested and studied (both for the stress distribution of the dam and its construction method) in China since 1958. However, most of them were constructed after 1970. Through the measurements of such types of dams in the field, the arch action predicted by the models in the cross section as well as in the plan (Arch-shaped Abdomen Arch Dam) during operation was confirmed. Special construction methods pertaining to this type of dam have been developed in practice and a description of these is also given in this paper.

AUTHOR: PAN Jiazheng [3382 1367 6927]

ORG: Bureau of Hydroelectric Development, Ministry of Electric Power

TITLE: "Applications of Fracture Mechanics to the Design of Hydraulic Structures"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 45-59

TEXT OF ENGLISH ABSTRACT: Cracks in the massive concrete of hydraulic structures are most harmful because of the mechanical and physical action of the percolating water. Since it is rather difficult to estimate whether the cracks are stable or not by conventional design methods, most hydrostructures are often designed under conservative considerations. The theory of fracture mechanics is now widely used in aeronautical and mechanical engineering with good results, but it is seldom used in hydraulic structures. In this paper, some possible applications of fracture mechanics in designing massive concrete works are described and shown with numerical examples, including: (1) the criteria for the stability of cracks or joints in massive concrete by the stress intensity factor, (2) the amount required and the effect of the reinforcement for closing the cracks, and (3) the determination of crack depth. However, for the further development of this theory in practical design work, more tests and research work are still needed.

9717
CSO: 4009

AUTHOR: LIU Jiacai [0491 0857 2624]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Principle and Technology of Polyurethane Grouting"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 71-75

ABSTRACT: Polyurethane is a new high molecular grouting material. Its experimental research began in China in the early 70's. Laboratory tests have now been completed as well as the period of intermediate field tests. Engineering application of this material will soon begin. The ingredients and the method of mixing this material and the technique of applying it as a grout to fill cracks of a width less than 0.1 mm are explained. Several difficult engineering problems resolved by using this grout material are described to illustrate the usefulness of the material.

AUTHOR: WANG Runfu [3769 3387 1381]
CHEN Hequn [7115 0735 5028]
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ORG: All of East China College of Water Conservancy

TITLE: "Initial Stress Method for Solving the Problems of Creep Stress"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 76-82

ABSTRACT: Concrete is a material having the characteristic of creep which will cause a slack of stress to cause it to be only about 0.6 times of the elastic original. At present, 2 methods are available to analyze creep stress: the slack method and the initial strain method. The former is an approximation and the latter is theoretically strict, but complicated computation is involved with the latter. The authors have derived an initial stress method with simpler calculation equations than the initial strain method. Physical equations of the initial stress method are explained starting with an explanation of the 2 ways of mathematical expressions of the creep characteristic. The paper also includes a brief comparison of the initial stress method with the other 2 existing methods.

AUTHOR: QU Xingye [4234 5281 2814]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Drainage Calculation for Tiles Under the Condition of Seepage From Canal and Ponded Water"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 60-65

ABSTRACT: In sections where irrigation canals and pottery tubes are alternately placed, a certain width on the ground surface is retained on both sides of the canals and above the head of the drainage tubes to form a water-free zone. The existence of a water level differential provides the condition for the canal and the seepage of the rice paddy to converge toward the hidden tubes or tiles. The method of computing the volume of seepage of the paddy and the gound water table has theoretical as well as practical significance in providing a reference for a reasonable design of the irrigatien and drainage engineering project of the paddy and its scientific management. Equations used for the calculation are analyzed. Sample culaculations are given as well as model experiment data to verify the correctness of the theoretical equations.

AUTHOR: DU Guohan [2659 0948 5060]
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ORG: Both of Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Sedimentation at the Tidal Barrages and the Agitation Dredging"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 65-70

ABSTRACT: In the coastal regions of China, a large number of tidal barrages have been constructed at the estuaries. These barrages have been very helpful in holding back the tide, draining flood water, and holding water for irrigation purpose. The problem of silting has occurred in all the estuaries with barrages, and the problem is the most serious in the sedimentary shores of Bohai and Huanghai zones. For example, 18 of the 20 barrages in Hebei Province and Tianjin City have been so seriously silted that the flow capacity in 1977 has been reduced to 1/6 to 1/4 of the original design of 1200 sec m^3. Studies in 1974-75 by Water Conservancy and Hydroelectric Power Research Instituteand Hebei Provincial Bureau of Conservancy indicate that if mechanical boat is used for agitation dredging during ebb tide, silting at the barrages may be prevented. The reason for silting is analyzed and the mechanism of the silting reduction action of agitation dredging is explained.

AUTHOR: CHEN Jiaqi [7115 1367 3823]

ORG: None

TITLE: "Do a Better Job of Engineering Planning in the Project of Transferring Southern Waters to the North"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 1, Feb 80 pp 82-85

ABSTRACT: In Apr 79, China Water Conservancy Society held a discussion meeting in Tianjin for gathering opinions from all concerned with respect to the technology of transferring southern waters to the north. Since the liberation, considerable amount of work has been carried out by many units and several hypothetical schemes of shifting water from the upper, middle, and lower reaches of the Yangzi to the Huanghe, Huaihe, and Haihe valleys have been proposed. In the past few years, as the demand for water for agricultural use grew intense in these valleys, more studies were done. For this type of gigantic engineering project, there is no concrete experience available here or abroad, it is; therefore, necessary to listen to diverse opinions. These opinions are briefly summed up in the paper into the following aspects: (1) Is the water transfer necessary? (2) Where is the water to be transferred from? (3) What is the best route for the water to travel? (4)What will be the expected changes after the water is transferred? (5)Is the water transfer program economically reasonable?

6168
CSO: 4009

AUTHOR: QIAN Ning [6929 1380]

ORG: Qinghua University

TITLE: "A Comparison of the Bed Load Formulas"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 1980 pp 1-11

TEXT OF ENGLISH ABSTRACT: There are six bed load formulas as proposed by Meyer-Peter, Einstein, Bagnold, Engelund, Yalin and Ackers-White respectively which are currently in use throughout the world. In this paper these formulas are transformed into relationships between same dimensionless parameters such that they can be compared directly. The results indicate that at low rates of transport, in spite of the fact that certain discrepancies existed between the various formulas, the differences are of minor importance from the practical viewpoint of fluvial processes. Different formulas deviate widely at high rates of transport, and the experimental data available do not allow one to draw a definite conclusion. When the flow intensity is high, the transport rate of bed load as given by Einstein's formula might be too small. Although Engelund's formula gives a fairly good result for all flow conditions, there

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is much ground for believing that the theoretical derivation of the formula fails to be consistent after $\theta > 0.5$. It appears at present that the approach as proposed by Bagnold opens up a new prospect to the research of bed load transport.

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ZHOU Guanlun [0719 0385 0243]
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LIU Jianmin [0491 1696 3046]
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ORG: WANG, GAN, ZHOU and WU all of the First Office, Bureau of Waterways of the Changjiang River; LIU of the Tianjin Research Institute of Navigation Engineering; DENG of Chongqing College of Communications

TITLE: "Navigation Regulations for the Upper Changjiang"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 1980 pp 12-25

EXCERPT FROM ENGLISH ABSTRACT: There exist three kinds of difficult reaches for navigation in the upper Changjiang River, namely, shoals, rapids and dangerous passages. The principles and practical measures adopted in the course of regulation of these are summarized and some formulas and empirical data recommended.

AUTHOR: BIAN Fuzong [0593 1381 1350]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Characteristics of Lateritic Soils Used as an Earth-Dam Material"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 1980 pp 26-36

TEXT OF ENGLISH ABSTRACT: This paper presents some experiences of earth-dam construction utilizing lateritic soils that covered the vast districts of southern China. It deals with the formative conditions of lateritic soils and studies the soil properties, such as mineral-chemical composition, grain-size distribution, plasticity, compaction, compression and shearing strength. In addition, it suggests some points that should be noticed in dam design and construction when lateritic soils are to be used.

AUTHOR: DONG Xinglin [5516 5281 2651]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Study on the Stable Cross-Sectional Area of Surge Tank"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 1980 pp 37-48

TEXT OF ENGLISH ABSTRACT: The design of the stable cross-sectional area of a surge tank in the past was based upon Thoma's formula which had been derived on the assumption of ideal regulation. The area calculated often tended to be larger than was actually required, resulting in not only the increase of project investment but also retardation of building speed. This paper considers the various influencing factors of stability, establishes a mathematical model of a water power station with a true regulation system, and derives a more complete equation for determining the critical cross section of a surge tank. By using this equation and through adjusting the governing parameters, a smaller cross-sectional area can be obtained than that given by Thoma's formula. It is indicated that the formulas given by Thoma and some other investigators are special cases of this equation. Also given in this paper is a simplified criterion equation for judging whether a total elimination of the surge tank in some cases is feasible.

9717
CSO: 4009

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ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Analysis of Problems of the Instantaneous Unit Hydrograph"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 49-54

ABSTRACT: The theoretical model of the instantaneous unit hydrograph was first published by J.E. Nash in 1960 and was soon introduced to China,and instantaneous unit hydrograph was applied by many domestic units to analyze rainfall and flow volume data of medium and small streams to provide a new way of design analysis for water conservancy and hydroelectric power engineering projects of medium and small sizes. In recent years, methods of dynamics have been increasingly applied in hydrology to study the nonlinear system of large river valleys, and there have also been progress regarding solutions to problems of input and output of sediments and water flow. Based upon these advancements, this paper attempts to analyze the initial condition which produces the equation of the instantaneous unit hydrograph for the purpose of improving the hydrological mathematical model so that it may more reasonably reflect the basic theory of computing the flow volume and convergence of rivers.
The author wishes to express thanks to XIAO Tianduo [5135 1131 6993] and FAN Jiahua [5400 1367 5478] for their support and assistance.

AUTHOR: CHEN Jisheng [7115 3444 3932]

ORG: Changjiang [Yangzi] Water Conservancy and Hydroelectric Power Research Institute

TITLE: "An Approach to Confined Flow Toward a Partially Penetrating Well"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 55-61

ABSTRACT: This paper proposes an approximate solution to the problem of axial seepage under certain special conditions. Parallel seepage is viewed as axial seepage to provide an indirect way of producing a mathematical expression. The seepage volume calculation equation thus offered in the paper is suitable for wells of different radius and may be used, under the condition of $S/T > 0.2$, to compute incomplete wells with a penetrating bottom to produce a precision similar to the currently accepted equation. The simplified equation derived from the approximate solution has a simple structure and a clear physical concept, and is easy to apply.

AUTHOR: XIA Yuchang [1115 3022 1603]

ORG: Scientific Research Center, Tianjin Prospecting and Designing Academy, Ministry of Water Conservancy

TITLE: "On the Evaluation of Velocity Coefficient of the Surface of Overflow Dam"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 62-67

ABSTRACT: For the purpose of calculating various elements of waterpower of an overflow dam, the velocity coefficient of the surface of the dam is a required important parameter. With respect to this coefficient, there have been numerous previous studies but these scientists used different methods for studying, measuring, and da data processing to produce different equations. The velocity coefficient obtained using the various equations is very different to put the designer in a dilemma, not knowing which equation to choose. This paper uses the boundary layer to derive an energy loss equation. A table is given listing 21 equations for velocity coefficient of the surface of overflow dam by 18 domestic and foreign authors to emphasize the complexity of the problem.

AUTHOR: ZHAO Shijun [6392 0013 0193]

ORG: Water Conservancy and Hydroelectric Power Research Institute

TITLE: "Drawing Contour Lines on Asphalt Felt as References to Help Reproduce the Topography in Hydraulic Models"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 68-70

ABSTRACT: This paper introduces a method of using asphalt felt as a topographical base to draw contour lines on it to control topographical altitudes and to pile layers and layers on it according to the contour lines for simulating topography on the hydraulic model. This method is especially suitable for regions of high mountains, gorges, and valleys. It may cause the simulated topography of a high degree of complexity to be very close to the reality. In the past years, the author and colleagues have used this method to to build tens of hydraulic models for several large scale hydroelectric power stations. The procedure of building this type of models is explained.
This paper was originally published as a hydraulic model making experience of the Fourth Engineering Bureau of the Ministry of Water Conservancy and Hydroelectric Power.

AUTHOR: DU Yanling [2659 1693 7881]
LI Chunhua [2621 2504 5478]
XU Jiahai [1776 1367 3189]

ORG: DU, LI of Water Conservancy and Hydroelectric Power Research Institute; XU of Zhejiang Provincial Water Conservancy Research Institute

TITLE: "Test Set-up to Study Permeability of Clays"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 71-75

ABSTRACT: At present, the Darcy Law of permeability is generally used for calculating consolidation and seepage of saturated clays. The law represents an experimental relationship derived from permeability tests of dry sand particles, however. For a long time, many have studied its applicability to saturated clays with variable conclusions. There have also been some who have used non-Darcy permeability laws in aspects of consolidation theory and sandy well designing to produce totally different results. The authors believe that there is a need for making a permeability instrument specially for clays, in a closed system, with the side flow and pressure unaffected by evaporation, capable of maintaining a constant head and guaranteeing complete saturation, to be used for tests under the condition of constant temperature. Using other existing clay permeability experiment equipment as references, the authors designed and made such a test instrument in 1965. This paper describes the instrument and its merits.

AUTHOR: ZHOU Mingde [0719 0682 1795]
ZHU Datong [2612 1129 0681]

ORG: ZHOU of Nanjing Water Conservancy Research Institute; ZHU of Dalian College of Engineering

TITLE: "Additional Mass Calculation for a Pipe Line Containing Flowing Fluids in Transverse Vibration"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 76-81

ABSTRACT: Transverse vibration of water or oil pipelines is one of the common vibrations with the characteristic of bending along the pipeline axis. For the calculation of additional mass of this vibration, currently the method of the mass of the fluid of the unit length of the pipeline is used. This is a method nearly half a century old. This paper takes into consideration the elastic deformation of pipeline wall in the vibration process to derive a theoretical equation for computing the additional mass. Simple experiments were conducted to test the validity of the equation so as to enable it to be used in pipeline engineering universally.

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ORG: XIE, WU of Northwest College of Agriculture; XU, JIANG of East China College of Water Conservancy; MA of Nanjing Water Conservancy Research Institute

TITLE: "Comments on Problems of Strength, Liquefaction, and Failure of Saturated Sand During Cyclic Load"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 82-85

ABSTRACT: The original paper "Problems of strength, liquefaction, and failure of Saturated Sand During Cyclic Load" by WANG Wenshao [3076 5113 7300] was published in SHUILI XUEBAO No 1, 80. Two papers discussing the contents of that paper have been published in the No 3, 80 issue of the journal and two more are presented here. The original paper uses the limit equilibrium theory to resolve the problem of stability in soil dynamics. Comments and disagreements concern mainly with the use of the limit equilibrium theory as an index of measuring failure to study the problem of vibration liquefaction of saturated sand. It is pointed out that limit equilibrium under dynamic load is a different conception from limit equilibrium under static load, and limit equilibrium does not imply that at that point the soil bodyhas reached a critical state of failure.

AUTHOR: ZHOU Qunli [0719 5028 0500]

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TITLE: "Comments on the Applications of Fracture Mechanics to the Design of Hydraulic Structures"

SOURCE: Beijing SHUILI XUEBAO [JOURNAL OF HYDRAULIC ENGINEERING] in Chinese No 4, 80 pp 86-87

ABSTRACT: The Original paper, "Applications of Fracture Mechanics to the Design of Hydraulic Structures" by PAN Jiazheng [3382 1367 6927] was published in the No 1, 80 issue of the journal, emphasizing the necessity and urgency of fracture research in hydraulic structure designing. The author of this paper agrees with the general context of the original paper and provides additional evidence to testify to the urgent need of applying fracture mechanics in the designing of hydraulic structures. Some errors of the original paper are also corrected.

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CSO: 4009

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WU Qingxuan [0702 3237 3872]

ORG: None

TITLE: "Studies on the Modification of Preparation of Human Leucocyte Interferon"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 65-68

ABSTRACT: The modified method for the preparation of human leucocyte interferon developed by the Institute of Virology of the Chinese Academy of Sciences was reported satisfactorily adopted in this research. The method adopts human umblical cord blood to replace veinal blood for human leucocyte interferon, and anticoagulative total blood to replace extract of leucocytes for interferon inducers, as specified in the "International Symposium on Standardization of Interferon and Interferon

[Continuation of JIEFANGJUN YIXUE ZAZHI Vol 5 No 2, Apr 80 pp 65-68]

Inducers". The modification has proved to be satisfactory, besides solving the problem of supply, and simplifying the procedure of human leucocyte interferon preparation.

The umblical blood and embryo were respectively supplied by the Shanghai Yangshupu District Women and Infants Health Hospital and the Department of Gynecology and Obstetrics of the Second Military Medical university's Changhai Hospital.

AUTHOR: WANG Xiangsheng [3769 3276 3932]

ORG: None

TITLE: "Correlation Technique and Its Application toHis Bundle Electrocardiograms. Part II"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 69-72

ABSTRACT: This section of the article concludes a previous study on the application of the correlation technique in His bundle electrocradiograms. It is concluded that the technique can definitely be used as an alternative to the superposition technique, and, furthermore, has the advantages of magnetophone omission, lower residual noise, higher resolution, less dynamic deviation, and higher precision. In the nontraumatic examination of conducting system diseases, both techniques are superior to the duct technique.
The electronic computor used in this study has only 1K internal storage, 16 digits, no external storage, and operation speed of 40,000 times per second.

AUTHORS: WANG Zenqwei [3076 2582 3555]
WANG Weixin [3769 4850 2450]

ORG: None

TITLE: "Use of Valved Conduit for Surgical Correction of the Tetralogy of Fallot with Absence of Left Pulmonary Artery: Report of One Case"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 73-74

ABSTRACT: A case of tetralogy of Fallot with absent left pulmonary artery (mortality 44-48%) was reportedly successfully corrected with vulved conduit surgery, when the right ventricle was rebuilt, and the pulmonary artery continuity restored. The valved conduit selected for the surgery is 18 mm in diameter, and was deviated rightward to become "C" shaped. No valved conduit obstruction was observed after the surgery.

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WU Kunying [0702 0981 3853]
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TITLE: "Effect of Polygonum cuspidatum on the Microscirculation of Skin Burn Animals"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 75-77

ABSTRACT: 60 artificially burned rabbit ears were treated with intravenous injection of the traditional Chinese medical blood invigorative herb Polygonum caspidatum Siel et Zucc, and observed under microscope for the rate of blood flow, and changes of flow characteristics in the regenerated and preformed tissues. The results confirm that the herb definitely reduces exudation, resists bacteria, dilates blood vessels, and contains thrombosis. The herb has also proved to contain mainly polydatin.

AUTHORS: WANG Liangneng [3076 5328 5174]
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TITLE: "Plastic Surgery in Burn Contractures"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 78-80

ABSTRACT: This article reports a statistical analysis of 905 cases of plastic surgery on burn contractures in a military hospital during the last more than 20 years. The results show that 754 cases or 83.31% were good, 145 cases or 16.02% improved, and 6 cases or 0.66% poor. From a discussion on the questions on the urgency of timely treatment, and the timing of surgery, it is recommended that surgery be performed at the earliest possible date, even prior to cicatrization, and the adoption of such techniques as skin grafting, or local skin valvotomy, or both.

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ORG: None

TITLE: "Effect of Pre-operative Intravenous Drip of ACTH on Post-operative Reactions"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 81-85

ABSTRACT: Preliminary clinical observations and laboratory study on post-operative reactions of pre-operative intravenous drip of ACTH on 48 patients and mice tends to indicate that such ACTH administration promotes adrenocortical secretions and catecholamine synthesis, which preactivates adrenal sympathetic nerve's internal secretions, and thus favors improved patients' reactions to surgical wounds. The laboratory study includes pre- and post-operative changes of the internal secretions from adrenal sympathetic nerves, as well as excretions of 17-OHCS, adrenaline and VMA in 24 hours after the pre-operative ACTH drip.

AUTHORS: LIU Shunian [0491 2050 1628]
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ORG: None

TITLE: "Significance of Digital Pulse Wave Monitor During Anesthesia"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 86-88

ABSTRACT: The study on the effect of digital pulse wave monitor of anesthesia concludes that it is effective in monitoring: 1) the block anesthesia of ischiatic and brachial plexus nerves; 2) volumetric perivascular changes from sympathetic block of spinal and epidural anesthesia; and 3) whether the administration of ether in general anesthesia is sufficient or stable. However, it is not effective in monitoring intravenous procaine general anesthesia. Furthermore, under certain conditions, the technique may be of help in ascertaining the degree of terminal vasoconstriction and dilatation, microcirculatory conditions, and heart contractions.

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TITLE: "Studies on Some Problems of the Management of War Wounds of the Extremities and Vertebrae"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 89-93

ABSTRACT: This article reports a statistical analysis and discussion on the follow-up treatment of firearm inflicted extremities and spinal wounds derived from the recent Vietnam self-protection war,the results and existing problems under the categories of: 1) firearm caused

[Continuation of JIEFANGJUN YIXUE ZAZHI Vol 5 No 2, Apr 80 pp 89-93]

fractures of the extremities; 2) firearm caused spinal column and cord wounds; 3) firearm caused vascular wounds of the extremities; 4) firearm caused extremities wounds complicated perimuscular interspace syndromes; 5) perineural wounds and neuralgia caused by burns; 6) gaseous gangrene; 7) amputation of firearm wounds; and 8) rebuilding the function of late stage firearm wounds.

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TITLE: Extraction of Intracranial Shell Fragments Stereotactically by Magnetic Steel Needle"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] Vol 5 No 2, Apr 80 pp 94-96

ABSTRACT: This article reports successful extraction of 14 cases of intracranial shell fragments stereotactically by magnetic steel needle as of June 1979. The techniques introduced include directed puncture and bare-handed puncture. A discussion is also made on the advantages of adopting such technique for intracranial shell fragment extraction, its indications, and some surgical problems that deserve special attention.

11,206
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TITLE: "Studies on Empty-Gut Disease of Tussah. II. Identification of the Causative Agent of Empty-Gut Disease of Tussah, Streptococcus pernyi sp. nov."

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 225-229

TEXT OF ENGLISH ABSTRACT: The causative agent of empty-gut disease, a newly discovered disease of tussah, is a newly discovered pathogenic bacterium for tussah, a wild silk worm of economic significance in China. This pathogenic bacterium is a Gram positive coccus, 1-1.2 μm in diameter, mostly in pairs, with single cells or short chains seldom occurring. No spore. Non motile. In a medium containing sucrose 20 g, peptone 20 g, NaCl 5 g, meat extract solution

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 225-229]

1 liter, pH 7.5, abundant growth is produced. On agar plate the colonies are circular, entire, convex, smooth, opaque, 1.5-2.0 mm in diameter and pale yellow in color. In liquid culture, uniform turbidity is formed at first, and abundant flocculent precipitates are produced three days later. Catalase negative. Lactic acid, but no gas, is produced from glucose, i.e., homofermentative. Growth occurs at both 10°C and 45°C, at pH 9.6, in 6.5% NaCl and in 0.1% methylene blue milk, and is able to be initiated within the pH range from 6.4 to 11.5. No growth occurs at pH 4.9. The final pH of broth culture is between 4.9 and 5.15. Arginine is not utilized and no ammonia is produced from it. Folic acid is not required for growth. Acid is produced from litumus milk and litmus is reduced. Acid is produced from arabinose, xylose, fructose, lactose, maltose, sucrose, raffinose, dextran, glycerol, mannitol, sorbitol and rhamnose, but not from sorbose, inositol and erythritol. β-haemolysis is produced on rabbit blood agar plate.

Serological analysis shows that the antigenic structure of this tussah pathogen is complex. It contains not only Lancefield group D and group Q antigens with lower titer, but also a unique unknown antigen group of Lancefield with higher titer. Its antiserum does not react with antigens of Lancefield groups A, B, C and N.

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 225-229]

Accordingly, the morphological, physiological, biochemical and serological characteristics of the organism in question are identical with those of Genus Streptococcus, but differ from those of all known species. This causative agent of empty-gut disease is designated as a new species of Streptococcus, Streptococcus pernyi sp. nov., and culture 78501 is assigned as the type strain, deposited in Type Culture Collection, Chinese Academy of Sciences, as AS 1.1010.

AUTHOR: YU Yongnian [0151 3057 1628]
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ORG: YU of the Institute of Microbiology, Chinese Academy of Sciences, Beijing; ZHANG of the Department of Plant Protection, Agricultural University of Yunnan, Kunming

TITLE: "Corallocytostroma Yu et Zhang, Gen. Nov., a Stromatic Coelomycetes"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 230-235

TEXT OF ENGLISH ABSTRACT: A new fungal disease of rice has been found in Yunnan Province of China causing considerable damage to the rice culture, especially the foreign varieties. The symptoms of this disease are characterized by dwarfing of the plants, increasing the tillers, shortening the internodal elongation and reducing the number of notes. The disease is also characterized by forming superficial, solitary stroma which replace the spike. The causal organism of the disease has been identified as a new genus of the order Sphaeropsidales in the class Coelomycetes belonging to Deuteromycotina.

Corallocytostroma oryzae gen. et sp. nov. is characterized by the following diagnosis: Stomata superficial, solitary, depressed-globose or peach-shaped,

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 230-235]

yellowish brown or purplish brown, coniferous or furfuraceous at maturity, opening by irregular fissures; locules coralloid or convoluted, without any ostiole; conidiophores hyaline, aseptate, smooth, palisade-like, dense, obclavate, slender, formed from the inner cells of the locular walls; conidia hyaline, aseptate or septate (probably with distoseptae when septate), catenate, elongate-elliptical or elongate-oval, allantoid or vermiform, smooth, guttulate. The characteristics of the conidiogenous cell and the ontogeny of the conidium are not clear because of the failure to isolate and culture the fungus.

The morphological characteristics outlined above clearly indicate the necessity of erecting the new genus, Corallocytostroma. Nevertheless, there are some superficial similarities between the new genus and Creothyriella Batista et Costa, Cytospora Ehrenb., Kendrickomyces Sutton et al., and Phaeocytospora Sutton. The new genus is distinguished from Cytospora and Kendrickomyces by its superficial and solitary stromata, non-ostiolate and coralloid locules, hyaline and aseptate conidiophores, as well as its hyaline, catenate and septate or aseptate conidia. It differs from Phaeocytospora in not having immersed stromata, ostiolate locules, branched and septate conidiophores, as well as colored and aseptate conidia. The genus Corallocytostroma is also distinct from the genus Creothyriella in not possessing clypeate stromata, globose locules and aseptate conidia.

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The type specimen of the new species is deposited in the Herbarium Mycologicum, Chinese Academy of Sciences, Beijing, China.

AUTHOR: XU Lianwang [1776 6647 2489]
ZHAO Jiding [6392 4949 7844]

ORG: Both of the Institute of Microbiology, Chinese Academy of Sciences, Beijing

TITLE: "A New Genus of Polyporaceae from China"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 236-239

TEXT OF ENGLISH ABSTRACT: In 1957 when the first author made a mycological survey in the Simao District of Yunnan Province, China, many small-sized specimens of this genus were collected. At that time he only noticed their particular morphological features, but no detailed studies were made. About 20 years later similar forms of these particular specimens were collected once more by comrade HAN Shujin and the authors from Hainan Island, Guangdong Province, in 1977.

After studying in detail and noting references made with many descriptions, we considered these collections to be a new species of Polyporaceae. According to its leathery to corky caps and hymenium lining the inner surface of tubes, this species should belong to this very family. In particular, it is characterized

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by its sparse, single and free tubes, the surfaces of which are covered with densely caespitose tomenta and interwoven reticula. Moreover, the bases of the tubes are always embedded in the context. By these diagnostic characteristics this new species appears apparently not to be included in any other genera of Polyporaceae. Consequently a new genus is established here for it.

Superficially this genus is similar to some other genera which are included in other families on the morphological features, but it differs from those genera in the presence of its particular characteristics. As mentioned above, this genus has nothing in common with the genera of Boletaceae, of which the genus *Ixechinus* Heim seems to resemble this genus from the sparse tubes, but the *former is* well marked by its flesh and stipitate fruit bodies. The genus *Fistulina* is also fleshy and its hymenophore consists of densely crowded free *tubes*. The cyphelloid fungi, such as *Stromatocypha* (*Porothecium*), *Henningsomyces* (*Solenia*) and *Lachnella* (*Cyphella* and *Solenia*; Cunningham, 1963, p 307), are also similar to this new genus, but they are easily recognized by the membranous texture of thin subiculum or smaller caps, seldom exceeding 1.5 mm in diameter, each attached to the substratum by a brief base or vertex.

In a word, this genus is distinct from all other similar genera. If more ontogenetic information of this genus were obtained in the future, a reasonable

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taxonomic system would be found.

All the materials cited above are deposited in the mycological herbarium of the Institute of Microbiology, Chinese Academy of Sciences, Beijing, China.

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TITLE: "Some Freeze-Etched Aspects of Vaccinia Virus in the Process of Development"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 240-245

TEXT OF ENGLISH ABSTRACT: An electron microscopic study has been carried out on vaccinia virus infected HeLa cells by using the advantage of the freeze-etching technique, which is characterized by preferentially splitting biomembranes and giving the specimens a stereo-appearance. Some new information has been achieved and is summarized as follows:

1. The fracture faces and intramembrane granules:

The fracture planes of the immature virus particles varied according to the degree of maturation; at the initial stage the particles just being formed were always flatly fractured. With further development, when the particles became smaller

and denser they were in turn fractured through in between the bilayer of the envelope. Consequently two different faces appeared. The convex face was interpreted as the outer surface of the inner leaflet of the envelope and the concave face as the inner surface of the outer leaflet. Most of the intramembrane granules were found on the convex faces of the envelopes.

2. The granule free area:

This was characterized by a smooth membranous structure eccentrically located on the periphery of the intermediate particle. As the area was often seen associated with an underneath nucloid structure, it was also designated as the envelope of the nucloid (core).

3. The hexagonal shape found in the intermediate particles:

As shown in figures I and II, the hexagonal shape is as distinct as an icosahedron virus. This shape has never been seen so far, either in an ultrathin section or in negative stained specimens.

4. The crystalline structures found in the virus producing matrix:

The structure consisted of regularly arranged subunits; among them some hexomer relationships could be revealed and these were thought to be precursor materials to the making of the envelopes.

Some drawings illustrating the presumptive stereo-morphology of the immature vaccinia virus were also presented.

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ORG: YIN, TAO and YU et al., all of the Institute of Microbiology, Chinese Academy of Sciences, Beijing; NING, WANG Changhui and WANG Shuding et al, all of Beijing Pharmaceutical Factory

TITLE: "Studies on the Production of Vitamin C Precursor--2-Keto-L-Gulonic Acid from L-Sorbose by Fermentation. I. Isolation, Screening and Identification of 2-Keto-L-Gulonic Acid Producing Bacteria"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 246-251

TEXT OF ENGLISH ABSTRACT: 1615 strains of L-sorbose-utilizing bacteria were isolated from 670 samples by the enriched culture method in a medium containing L-sorbose as the sole source of carbon. Bacteria N1197A is a strain capable of producing vitamin C precurson--2-keto-L-gulonic acid from L-sorbose. It is a

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mixed culture of two different species of bacteria. The bacteria which produces larger colonies on the cultural plate does not produce any 2-keto-L-gulonic acid. The other bacteria, which produces minute pinpoint colonies on a cultural plate, can produce 2-keto-L-gulonic acid, but in small amounts. The former one is Pseudomonas striata and the latter one is Gluconobacter oxydans.

The fermentation product isolated and purified from the culture broth is a white crystal. It has been identified as 2-keto-L-gulonic acid by paper chromatography, elementary analysis and infrared absorption spectrum, etc.

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TITLE: "Expression of Cloned DNA Ligase Gene (G30) of E. coli Bacteriophage T_4 In Vivo"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 252-256

TEXT OF ENGLISH ABSTRACT: T_4 DNA ligase was extracted and purified from clones of T_4 DNA ligase gene by means of DEAE-cellulose and phosphocellulose column chromatography. Its behavior on the columns was the same as that of the ligase extracted from T_4 infected E. coli cells. The activity measurement of the

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 252-256]

enzyme also showed typical T_4 ligase activity.

The results provide evidence that a cloned T_4 ligase gene is able to express in vivo.

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SHEN Xueren [3088 1331 0088]
SUN Yukun [1327 3768 2492]

ORG: All of Shanghai Institute of Biochemistry, Chinese Academy of Sciences

TITLE: "Studies on Double-Stranded RNA Viruses. IV. In Vitro Synthesis of the mRNA of Cytoplasmic Polyhedrosis Virus of Silkworm Bombyx mori"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 257-262

TEXT OF ENGLISH ABSTRACT: The particles of dsRNA viruses, such as reovirus, rice dwarf virus and cytoplasmic polyhedrosis virus, are associated with a dsRNA dependent RNA polymerase. In general, the enzyme activity of RNA polymerase is detected by incorporation of radioactive precursor nucleoside-triphosphate into an acid insoluble product and the separation of the RNA replicated in vitro is rather tedious. In this report, we devised a simple and convenient method for the detection of the enzyme activity of replicase and the simultaneous collection of the mRNA of CPV.

The mRNA replicated in vitro could be effectively separated from the reaction

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mixture through DEAE-Sephadex A-25 column, so that the enzyme activity of the replicase of CPV purified by gel filtration was sufficiently high to be estimated without using radioactive substrates.

The results indicate that the mRNA replicated in vitro are single-stranded RNA and the optimum pH for the replicase is 8.0. Electronmicroscopic observations revealed that the particles of CPV isolated from the reaction mixture were intact particles. In the absence of S-adenosyl-L-methionine, the RNA synthesis of replicase of CPV was found to be negligible.

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TITLE: "Glucoamylase of Monascus sp. III. Comparison of the Two Molecular Forms"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 263-270

TEXT OF ENGLISH ABSTRACT: The glucoamylase from Monascus sp. exists in multiple molecular forms. The two major forms, E_3 and E_4, have been purified and proved to be homogeneous by disc gel electrophoresis. Their chemical compositions and some basic properties have been compared with the following results. The amino acid compositions of the two forms are similar, merely differing by 6 serine and 3 arginine residues, and less than 2 for the other amino acids.

The amino- and carboxyl-terminal amino acids of E_3 and E_4 are identical, the carboxyl terminus being tyrosine, but it was unexpected that two amino-termini (Asp and Ser) were found in both forms which were composed of single peptide chains.

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Both forms are glycoproteins, containing 7 and 9 percent total sugars as mannose. The component sugars are mannose, galactose and a trace of xylose and glucose.

The molecular weights of the two forms are without significant difference, being about 54,000 daltons as estimated by gel filtration or SDS-poly-acrylamide gel electrophoresis. The isoelectric points (pI) of the two forms differ slightly, being 4.00 for E_3 and 4.10 for E_4.

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TITLE: "Further Studies on the Mechanism of the Agglutinating Action of Streptococcus lactis in Starch Production"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 271-275

TEXT OF ENGLISH ABSTRACT: In a previous paper we showed that in the Chinese traditional "sour liquid" method of starch production, it is neither the acidity nor any of the fermentation products, but the microorganism itself that causes the precipitation of starch grains. The microorganism contained in the liquid agglutinates starch, thereby making the dispersed starch grains aggregate into big masses. The agglutinating action between the microorganism and the starch grains requires certain conditions: an optimal pH, a proper temperature and the presence of certain cations. Monovalent cations and certain divalent cations, such as Sr^{2+} and Ba^{2+}, have no effect, while Ca^{2+} has a weak effect.

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 271-275]

Among the di-, tri- and tetravalent cations tested, the agglutinating effect increases with the valency. The responsible microorganism has been isolated and characterized as a variety of Streptococcus lactis.

In the present paper, experiments were designed to study the effect of various physical and chemical factors, together with a series of enzyme preparations, on the agglutination between the bacteria and starch grains. All treatments which are known to denature proteins led to the loss of agglutinating ability of the bacteria. These included: heating, treatment with phenol, trichloroacetic acid, formaldehyde and lysol, ultraviolet radiation, ultrasonic waves, etc. Among the various enzymes tested, cellulase, pectinase, lipase, pepsin, trypsin, papain and lysozyme did not destroy the agglutinating ability of the bacteria, whereas chymotrypsin completely abolished it. Chymotrypsin which had been inhibited by a kunitz inhibitor no longer destroyed the agglutinating action of the bacteria.

According to the above experiments, it is believed that some special proteins, perhaps lectins, on the bacterial surface are responsible for the agglutinating action between the bacteria and the starch grains.

In this paper, the quantitative relations among the bacteria, starch grains

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and cations were also studied. The positive quantitative relationship among them seems to suggest that in the agglutination reaction, these three are in some fashion bound together. The nature of the binding sites remains to be investigated.

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TITLE: "A Starch-Agglutinating Factor on the Cell Wall of *Streptococcus lactis* Strain. I. Electron Microscopic Observation"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 276-279

TEXT OF ENGLISH ABSTRACT: In China, a sour liquor (suanjiang) containing a complex microbial flora was traditionally used for starch agglutination and precipitation in starch factories. The starch-agglutinating potency is due to the action of certain bacteria strains in this liquor. An effective strain of *Streptococcus lactis* was isolated in pure culture by the authors of the present work. The contact interfaces of the starch granules and bacteria were observed under SEM. The micrograph shows that the bacteria connect to the starch granules

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 276-279]

just like a chain or string is holding them together. The outer side of the bacteria cell wall is attached to the starch surface firmly. From the specificity and direct evidence of SEM micrographs, it can be ascertained that the agglutination capacity is biochemical in nature. It suggests that there is a chemical factor on the bacterial cell wall. This factor is a kind of protein as proved by chymotrypsin treatment. As a functional protein it can be obtained from the purified cell wall, or even can be obtained in the ultracentrifugal supernatant after lysozyme treatment. This active protein seems to be a lectin-like substance.

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TITLE: "Preliminary Studies on the Correlation between Induced Nitrate Reductase and Nitrogenase in Azotobacter vinelandii"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 280-284

TEXT OF ENGLISH ABSTRACT: Nitrate reductase was induced in Azotobacter vinelandii cell suspension in 0.1 M $NaNO_3$ for intervals of several hours and the activity of the cell free extract reached a maximum of 21.9 nMoles NO_2^-/min mg protein at 24 hours. The nitrogenase activity of the cell extract of these induced cells declined more rapidly than did that of the uninduced one. Experimental evidence indicates that this phenomenon is due to the inactivation of component II (Fe protein) but not component I (Fe.Mo protein) of nitrogenase during the induction period.

Cells of Azotobacter vinelandii U_W45 mutant (known as lacking in Fe.Mo cofactor)

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also showed induced nitrate reductase activity by the same treatment, suggesting that the two Mo-containing enzymes do not share a common subunit.

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TITLE: "Study on the Separation of Crystals from Spores of *Bacillus thuringiensis*"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 285-288

TEXT OF ENGLISH ABSTRACT: By using the isopycnic centrifugation in a Urografin gradient and the fluid diphasic systems, we have purified crystals from nine strains of *Bacillus thuringiensis* (belonging to six varieties). The highest purity of all these crystal preparations separated with both procedures was over 99 percent, but in the latter method the crystal preparations are sometimes contaminated with some vegetative rods or sporangium membranes. The results obtained by both methods were compared.

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TITLE: "Studies on the Wheat Rosette Stunt Virus"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 289-295

TEXT OF ENGLISH ABSTRACT: Wheat is seriously attacked by rosette stunt disease in north China. Some reports have indicated that the disease was transmissible by the planthopper (*Laodelpha striatellus* Fallen) and numerous bullet virus particles have been observed in the cell of the diseased plants and its vectors. We purified the virus from the diseased plant and injected it into the nonviruliferous nymphs of *L. striatellus* Fallen. After inoculation, the insects were transferred onto the healthy wheat plants which then produced typical rosette stunt symptoms, thus demonstrating the infectivity of this bullet virus, i.e., wheat rosette stunt virus (WRSV).

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In order to investigate the host range of the WRSV, 27 gramineous plant species, including both the cultivated and wild species, were tested. The results of the inoculation studies demonstrated that 17 species, representing 6 tribes of the gramineae, were proved to be hosts. Of these, 15 species exhibited symptoms, 2 species with no symptoms also carrying the virus.

Among the 43 varieties of wheat tested, 2 of them were proved to be resistant to the disease.

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TITLE: "The Immobilized Cells of Candida rugosa Possessing Fumarase Activity"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 296-302

TEXT OF ENGLISH ABSTRACT: The immobilized cells of Candida rugosa C90 possessing fumarase activity were prepared by different methods, and the most active immobilized cells were obtained by entrapment in polyacrylamide gel.

The enzymatic properties of immobilized Candida rugosa C90 cells were investigated and compared with those of the native cells. The effects of pH, temperature and bivalent metal ions on the reaction rate of both immobilized and native cells are the same. The heat stability of the immobilized cells was somewhat higher than that of the native ones. Bivalent metal ions, such as Mn^{++}, Mg^{++}, Ca^{++} and Fe^{++}, could not protect the enzyme from thermal inactivation.

The enzyme activity remained constant during 91 days of storage at 4-6°C.

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The immobilized cell column can be used for continuous production of L-malic acid from 1 M fumarate at 30°C. When a solution of 1 M substrate (pH 8.5) was passed through an immobilized cell column at a flow rate of space velocity (SV) = 0.38, the highest conversion rate of 82-85 percent was attained. The immobilized cell column operated steadily for two months. The half-life of the fumarase activity of the immobilized cell column at 30°C was 95 days.

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TITLE: "Bacterial Leaching of Cobalt from Arsenic-Containing Sulfide Ores"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 303-309

TEXT OF ENGLISH ABSTRACT: A strain of Thiobacillus ferrooxidans capable of degrading arsenopyrite and tolerating arsenic has been isolated from acidic mine

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 303-309]

water of the arsenopyrite deposit. The best conditions for leaching of cobalt from arsenic-containing sulfide ores by this organism have been established as follows: pH 2-2.3, temperature 32°C±, aeration rate 0.19-0.21 VVm, sample particle size -160 mesh, solid concentration 20 percent. After leaching for 5-7 days in a laboratory experiment, the leaching rate of cobalt was about 80 percent and occasionally 90 percent.

Fourteen batches of the pilot plant experiment were carried out in draft tube tanks; the raw material being treated was 0.4 tons (6 batches), 3 tons (5 batches) and 4 tons (3 batches) respectively. The average leaching rate was 77.8 percent, but the leaching time was 2-3 days longer than that of the laboratory experiment.

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TITLE: "Studies on Some Factors Influencing the Hemagglutinating Properties of Adenovirus"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 310-315

TEXT OF ENGLISH ABSTRACT: The activities of adenovirus hemagglutinin (HA) prepared in human embryonic kidney cell culture are described. The influencing factors, such as erythrocytes from different individual monkeys, their concentrations, incubation temperatures and pH of the diluent, are studied. Results obtained show that the hemagglutinating titers of types 3, 7, 11, 14 and 21 adenovirus are not only influenced by the different individual monkey red cells, especially those of types 3, 7 and 14, but also by the different concentrations of red cells, incubation temperatures and pH of the diluent. The optimal conditions for adenovirus HA test are as follows: using sensitive monkey red cells, 1 percent red cell suspension, 1/50 M pH 7.6-8.0 PBS, 1 hour incubation at 37°C.

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 310-315]

Human embryonic kidney and HeLa cells can be used for the preparation of adenovirus HA. The human embryonic kidney cell cultures are infected with 10^3-10^5 $TCID_{50}$ of adenovirus. After CPE appears complete, the supernatants showing the highest HA titer are collected. The HA titer of type 7 adenovirus cultured in the human embryonic kidney cells is significantly higher than that of type 3 adenovirus.

The HA activity of the adenovirus is stable for several months at 4°C, that of types 7 and 11 decreased at 45°C for 15 minutes and that of types 3, 7 and 11 lost completely at 60°C for 30 minutes. Ultraviolet treatment, repeated freezing and thawing and ultrasonic treatment could also result in decreasing of the HA titer.

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TITLE: "Study on the Outer Envelope Vaccines of Leptospira. I. The Preparation, Properties and Immunogenicity of the Outer Envelope Vaccine of Leptospira"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 316-322

TEXT OF ENGLISH ABSTRACT: This paper reports the study of outer envelope vaccines of Leptospira. The salt-altered cell (SAC) and the outer envelope of L. icterohaemorrhagiae and L. pomona were filtered through the milipore filters (SAC, 0.85-1.2μm and 0.45μm). This modified method is found to be simple and more rapid since no special equipment is required, and it is a new way to prepare

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 316-322]

the outer envelope vaccine of Leptospira in large quantities.

The shape of the outer envelope of Leptospira under an electron microscope was found to be round or irregular. The chemical composition varies with different groups: that of L. icterohaemorrhagiae contains, by weight, 37.77 percent protein, 22.21 percent carbohydrate and 17.77 percent lipid; that of L. pomona consists of 59.72 percent protein, 13.69 percent carbohydrate and 14.90 percent lipid by weight. The outer envelope was susceptible to pH 12 heat, which gave the suggestion that some of the protective antigen may be heat-labile. The antibody level of the rabbit immunized with the outer envelope vaccines was higher than that of the commercial vaccines and it could be maintained for at least six months.

An experimental leptospiral outer envelope vaccine (icterohaemorrhagiae and pomona group) was evaluated for its protective efficacy in hamsters and/or guinea pigs by the development of clinical diseases or renal shedding of Leptospira after challenge. In hamsters a dose as small as 0.1 ml protected 100 percent of the animals against challenge with L. icterohaemorrhagiae, while 100 percent of the control hamsters died after challenge. A dose of 0.2 ml protected 100 percent of the vaccinated guinea pigs from clinical diseases and renal shedding, while the control guinea pigs all died. It was considered that the outer envelope vaccine possesses significant protection potency.

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TITLE: "Preliminary Studies on the Purification of Envelope and Cell Wall of Chlamydia trachomatis and Examination of Their Structures"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 3, Sep 80 pp 323-327

TEXT OF ENGLISH ABSTRACT: The envelope and cell wall of purified Chlamydia trachomatis TE-55 were prepared by ultrasonic treatment, enzymic digestion and differential centrifugation. Used for their purification was 5-50 percent meglumini diatrizoici density gradient centrifugation. The reproducible bands of the envelope and cell wall were obtained.

Ultra-thin sections and freeze-etched preparations of intact cells, and negatively

[Continuation of WEISHENGWU XUEBAO Vol 20 No 3, Sep 80 pp 323-327]

stained envelope and cell wall were examined by electron microscope.

The envelope of the elementary bodies was found to consist of three layers, as described by previous workers. Closely packed and regularly arranged subunits, about 28 nm in dimension, were observed in the cell wall. Other details of the cell fine structure were also described.

The polypeptide components of the envelope and those of the cell wall have also been analyzed by SDS-polyacrylamide gel electrophoresis.

The properties of membranes in C. trachomatis and Gram-negative bacteria are compared.

9717
CSO: 4009

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ORG: State's Science Committee

TITLE: "An Imperative Course for Modernization--the Science of Economic Results"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 9, 16 Sep 80 pp 8-9

ABSTRACT: Adoption of modernized techniques, equipment, materials, work procedures, and management methods should raise the labor productivity and reduce the cost, but in some cases, the economic benefits of these measures may not be good. In China, the number of tractors increased 3.7 fold from 1965 to 1975, but the machine cultivated acreage increased only 1.13 fold in the same period. The main reason is the fact that agricultural machines are not assembled in sets in China to cause a large number of tractors to be used for transport only. China has fewer computers than advanced countries, but almost 1/3 of the available computers are not being used. Railroad electrification is a high investment venture. It is supposed to make the train faster, more efficient, and carry more cargo, but the electrified line from Yangpingguan to Ankang in Shaanxi is used very little due to lack of cargo. These facts are used by the author to explain the importance of the science of economic efficiency in modernization in order that there may not be waste and badly coordinated construction.

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ORG: None

TITLE: "On Modern Torpedoes"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 9, 16 Sep 80 pp 12-13

ABSTRACT: The paper starts the story of torpedoes with the martyrdom of Deng Shichang [6772 0013 2490] during the first Sino-Japanese War and its invention by Robert Whitehead of England. Since then, torpedoes have changed a great deal. Modern torpedoes are almost all guided. The sonar of the torpedo itself obtains the information for self-guidance and controls the horizontal and directional rudders of the torpedo to guide it toward the target. Torpedo designers install water spraying engine to imitate squids and cover it with simulated dolphin skin to reduce the water resistance to half. These and other modern features of torpedoes are told.

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TITLE: "Optical Fibers of the 80's"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 9, 16 Sep 80 pp 22-23, 21

ABSTRACT: In 1880, Alexander Graham Bell tested his "light transmitted talking machine" but he failed to make it work. Today, a century later, optical fiber communication has become a reality. According to theoretical estimate, one laser should be able to simultaneously transmit all the telephones, telegraphs, and television of all of America, or to convert all the words in the 30 volumes of Encyclopedia Britannica into signals within 1/10 of a second. In Chicago USA, the telephone company uses an optical cable made of 24 glassfibers to transmit telephone, facsimile, and computer data; the cable is capable of transmitting all the contents of all the issues of National Geographic published in the last 100 years in one second. In 1979, Japan built an optical fiber center to serve as a computer headquarter and a television broadcasting station as well. These and other facts about optical fibers are discussed, but there is no mention of optical fiber research in China.

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TITLE: "Bright Future for Pipeline Transportation of Chemical Energy"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 9, 16 Sep 80 pp 40, 17

ABSTRACT: In thermoelectricity generation, only 30-40 percent of the total energy of the fuel is utilized. If the need is for heat energy, the electric energy must be converted back to heat energy. This is an extremely unreasonable way of using energy, yet electricity is very convenient to deliver and very little is lost when it is transported a long distance away. Methane is a good chemical energy and much more efficient than electricity as a heat energy. Recent experiments have disclosed that methane is very soluble in water. Under the high temperature condition of 100-1100°C, methane and water mixture will heat decompose into carbone monoxide and hydrogen which can be transported to the customer in a pipeline. At present, pipeline transportation of chemical energy is still in an experimental stage. When it is officially applied in industries, even if it raises the energy conversion efficiency only 10 percent, several tens of millions tons of coal may be saved every year. Chemical energy may also be conveniently stored for use when it is needed.

6168
CSO: 4009

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TITLE: "Major Tasks of China's Marine Biology in the New Era"

SOURCE: Beijing HAIYANG KEXUE [OCEANOGRAPHY] in Chinese No 1, 9 Jan 80 pp 1-5

ABSTRACT: In the new era, the first responsibility of every scientific field is to serve the realization of 4 modernizations. The one important problem facing the new China is how to raise the quality and the quantity of foods so as to improve the people's livelihood and strengthen their physical health. This is the major task now and in the coming decade of biology as well as marine biology. In reality, it is to raise the bio-productivity of the coastal seas of China. In the first decade after the liberation, the annual yield increase of marine products was close to 25 percent. In the 2 decades following, the total increase was 50 percent. Not only the rate of increase dropped, so did the quality of the products. The main reason was excessive catch and blind enclosure of the beaches to turn them into cropland. With some marine animals and plants, the case is different. Artificial breeding and culture have increased the number of species as well as the quantity of yield. Laminaria japonica Aresch is the typical example. The future of China's marine biology rests in intensive and extensive farming of the coastal seas, in the author's opinion. The paper includes lengthy data of accomplishments in Japan, which the author rates as the most developed country of the world in marine products.

AUTHOR: FANG Zongxi [2455 1350 3556]

ORG: Shandong College of Oceanography

TITLE: "Marching Toward the Seas to Serve Four Modernizations"

SOURCE: Beijing HAIYANG KEXUE [OCEANOGRAPHY] in Chinese No 1, 9 Jan 80 pp 6-7

ABSTRACT: China is a coastal country, with a shoreline as long as 18,000 km. Now that Lin Biao and the gang of four are down and the spring of science is here, the condition is perfect for developing China's oceanography to serve 4 modernizations. For this, the author proposes: (1) Systematic survey and research of China's offshore petroleum resources; (2) Carrying out basic research of tides, currents, topography, etc. for the development of power resources of the sea, with emphasis on problems of electric power generation with the energy of the sea; (3) Studies for enlarging the farming acreage of the sea and for increasing the number of species for breeding and culture; (4) Developing research of oceanographic ecology in conjunction with the grave problem of pollution of the oceans. The quality of the ocean environment must be protected so that the yield of marine products may not contain pollutants which may harm the health of the people.

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TITLE: "Oceanic Environmental Chemistry of Polychlorinated Biphenyls"

SOURCE: Beijing HAIYANG KEXUE [OCEANOGRAPHY] in Chinese No 1, 9 Jan 80 pp 23-29

ABSTRACT: Polychlorinated biphenyl is an artificially synthesized organic chloride having some similarity with the insecticide DDT in molecular weight, structure, and chemical property. Due to its chemical stability and its noninflammable and insulating characteristics, it has become a superior industrial material, widely used in electrical instruments, paper-making, pharmaceuticals, etc. mainly as heat carrier, plasticizer, lubricant, paint, etc. Due to losses in the production process and improper treatment of waste, PCB has become a global environmental contaminant. PCB enters the oceans through the atmosphere, the city sewer, the discharged industrial liquid waste, the streams, and the peeling paint of ships. In the coastal seas of Japan, the accumulation of PCB is estimated to be more than 30,000 tons, although in some countries, the use of PCB has been prohibited. Some believe PCB is not bio-degradable. This view is undoubtedly incorrect. Japan has reported 2 types of PCB eating yeasts, capable of decomposing 40 and 30 percent of PCB respectively. The relative stability of PCB may cause it to be useful as a tracing agent of organic geochemistry to study its transfer and distribution in the various circles of the sea and the land.

6168
CSO: 4009

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ORG: None

TITLE: "The Relationship of Heat and Cold to Earthquakes"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 3, 26 Jun 80 pp 10-12

ABSTRACT: An analysis of 54 earthquakes of magnitude 7 and above, including 13 of magnitude 8 and above, between 780 BC and the present, shows that the vast majority of them fell in the four major cool periods during this time span, or on the boundaries of these periods. Between 1800 and 1876, four periods of earthquake activity in China can be recognized, and these tend to correspond to relatively cold periods over that time span. An analysis of earthquakes of magnitude 6 or above over the period 1951-65 gives the following results: earthquakes in North and Southwest China tended to occur when the preceding year had had an above-average annual temperature and winter temperature; in the Northeast they tended to occur in a year after a year with an above-average winter temperature; in the Northwest there was also a connection with a preceding warm winter, but to a less pronounced degree. The few earthquakes in South China seemed to follow cold winters. Both the Tangshan and Yongshan Pass earthquakes were preceded by unusually warm years and relatively high winter temperatures.

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TITLE: "An Experiment with Bedrock Markers on a Monitoring Station Baseline"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 3, 26 Jun 80 pp 30-31

ABSTRACT: The accuracy of a horizontal baseline with reference points set in the surface layer and one with reference points fastened to bedrock was compared. In each case the east-west leg crossed a fault, while the north-south leg did not. The determination in the E-W leg was affected by air pressure and subsurface water, and that in the N-S leg only by subsurface water. The surface markers were mounted in concrete structures which entended a maximum of 1.5 meters below ground and had a base measuring 1.5 x 1.5 meters. The bedrock-mounted markers consisted of two concentric tubes, with the inner tube driven 6 meters into bedrock and extending between 16.2 and 19.7 meters below the gound surface. The measurement error was about 0.3-0.4 mm. A relatively large seasonal variation was observed in the E-W leg of the surface-mounted marker. A sharp change (+0.90 mm) was observed in the N-S leg of the surface marker line in May-June 1978 as a result of subsurface water changes. The total change in the N-S baseline of the bedrock-mounted markers was only 0.23 mm. Experimental results indicated that the bedrock-mounted markers were more stable.

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TITLE: "The Water Radon Dynamics of the Shankou No 4 Well"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 3, 26 Jun 80 pp 34-35

ABSTRACT: Large fluctuations were noted in the water radon content of the Shankou No 4 well in Hebei. For comparison purposes, in 1974 comparison samples began to be taken fron the Shan No 5 well, 150 meters south of the Shankou No 5 well, which was used by the peasants. In the period 1974-78 it was found that water radon levels in the latter well tended to be opposite to those in the former. A suggested explanation is as follows: the Shan No 5 well is relatively shallow (10.83 m) and extends into rock with relatively high water radon content. Irrigation withdrawals from this well tended to deplete the surrounding rock of radon-rich water, with the result that the nearby Shankou No 5 well (189.24 m deep) was supplied with water primarily from deeper layers which were relatively radon poor.

AUTHOR: WU Bing [0702 0365]

ORG: None

TITLE: "The Effect of Temperature on Gravitational Constant Observations"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 3, 26 Jun 80 pp 36-38

ABSTRACT: Among the factors which can affect gravimetric readings are temperature changes, nearby buildings, air pressure, and tides. Measurements on two model GC-2 gravitational instruments show temperature dependences of 6.25×10^{-6} T and 6.78×10^{-6} T. Readings taken with GS-15 instruments showed a pattern of higher readings in the warmer summer months. For maximum accuracy, the proper operating temperature settings should be chosen; best results for the instruments in question were achieved with the 40-45° C setting. Changes in room temperature had a slight effect on the interior temperature of such instruments. Changes in the external temperature can cause drift in the recording curve in two ways: by changing the elasticity of the elastic system, and by producing uneven temperature changes in the mount. To minimize interference, the observation conditions should be chosen such that the temperature effect is minimal, and regression analysis should be used to exclude interference effects.

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TITLE: "The New Tangshan Under Construction"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 4, 26 Aug 80 pp 2-3

ABSTRACT: The guidelines for the reconstruction of Tangshan are "large-scale decentralization, small-scale centralization, integration of city and countryside, beneficial to production, convenient to live in." The old section of Tangshan (population 250,000) will be the city's economic, cultural and governmental center. This section, the eastern mining section (300,000) and the new district (100,000) are spaced about 25 km apart at the apices of a triangle, with the central area being agricultural. A coal-bearing area south of the old city will be made a scenic area. The reconstructed city will have about the same area of buildings as before, about 14 million square meters, including 7.8 million square meters of dwellings divided into 100 small districts of 3,000-10,000 persons each, grouped by fours and fives into larger residential districts of 30,000-50,000 persons. The basic housing units will be buildings containing 1-room to 3-room apartments. The reconstruction plan spans 4 years (1979-1982). As of Febuuary 1980, 5.09 million

[continuation of DIZHEN ZHANXIAN [SEISMOLOGY FRONT] No 4, 26 Aug 80 pp 2-3]

square meters of buildings has been constructed, including 2.16 million of residential buildings. Many of the residential buildings are 4 and 5 stories. Eight design organizations are involved in earthquake-resistant design. Four major design types are: "poured interior, hung exterior," "poured interior, masonry exterior," "brick and mortar column construction," and "framing with light panels." In 1980, the critical year of the reconstruction, 3 million square meters of construction, including 2.3 million square meters of residential buildings, is to be completed.

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ORG: None

TITLE: "An Alarm on the Conjunction of the Nine Planets"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 4, 1980 pp 20-22

ABSTRACT: In 1982 (approximately 9 March), all nine planets in the solar system will be roughly in line, an event which occurs approximately once every 179 years. In a 1974 book, J. R. Gribbin and Stephen Plagemann suggested that this event would be accompanied by solar activity and geophysical phenomena and would pose the danger of a major earthquake, particularly on the San Andreas Fault. The fact is that several planets, notably Mercury and Jupiter, cause solar tides and affect solar activity and the sunspot cycle. This solar activity could have a triggering effect on sensitive earth structures by leading to the flow of large numbers of charged particles from the sun to the earth, which would affect atmospheric circulation and structure; the movement of large air masses could lead to earthquakes. The prediction of a danger period in 1980-84 is to be taken seriously, as indicated by the following phenomena: a very high number of sunspots in November 1979; a speeding up of the earth's rotation in 1979; a rare upsurge of

[continuation of DIZHEN ZHANXIAN [SEISMOLOGY FRONT] No 4, 1980 pp 20-22]

floods in the Los Angeles vicinity; a shift of more than 24 cm in the position of Pasadena since April 1979; increased radon levels in deep wells in California for the first time; and earthquakes of magnitude 6 and above along the San Andreas Fault. Although there was no major earthquake activity in China in 1801-1805, when the planets were lined up previously, there were major quakes 179 years before that, in 1622-1626. Although currently China is in a period of low earthquake activity, there is reason for vigilance.

AUTHOR: HU Yu liang [5170 3022 5328], CHEN Xiancheng [7115 3759 4453]

ORG: None

TITLE: "A Brief Discussion of Microseisms in Hunan"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 4, 26 Aug 80 pp 32-34

ABSTRACT: Hunan is an area of China in which earthquakes are uncommon. But many minor earthquakes have been observed in three areas: Cili, Lianyuan and Shaodong. The earthquakes in Cili were of magnitude 1.0-2.3 but had intensities up to 5; those in Shaodong were of magnitude 0.7-2.8 with intensities up to 6. In both cases they were associated with newly-built reservoirs. Analysis of the geology of the regions of their occurrence indicates that they resulted from seepage of water from newly-filled reservoirs into karst formations, thus reducing the friction in unstable structures. The Lianyuan earthquakes began in 1973, had magnitudes up to 3 and were of intensities up to 5-6. Analysis of their occurrence indicates that they resulted from withdrawal of water from the Qiaotouhe mine.

AUTHORS: LUO Guangwei [5012 0342 0251], SHI Xizhong [4258 6932 1813]

ORG: None

TITLE: "Rock Fracture Experiments With Radium and Thorium Emanations"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 4, 26 Aug 80 pp 38-39

ABSTRACT: Radon and thorium emanations picked up by an air current when rock samples were subjected to uniaxial fracture were measured. When a specimen of Badaling granite was subjected to rapid fracture, there was an abrupt jump in radioactivity. When another Badaling granite sample and a Tianshan granite sample were subjected to slow fracture, increases in emanations began when small fractures appeared and continued after the main fracture. The Tianshan sample was cemented together, which decreased the rate of emanations. When it was again subjected to pressure, there was a larger increase at the time of appearance of small cracks than on the previous occasion. The results obtained with a sample of cement with radon sealed into cavities in it were similar to those for natural samples. The results are suggestive of the rise in radon content of underground water before and after earthquakes.

AUTHOR: QIN Bingyi [4440 3521 3354]

ORG: None

TITLE: "Subsurface Water Anomalies Before the Wuyuan Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 4, 26 Aug 80 p 40

ABSTRACT: The subsurface water-bearing layer, 1-2 meters below the surface, in the vicinity of Wuyuan, exhibited some anomalies in the period preceding the 1979 earthquake. Starting on 5 August the water in some wells showed a rapid rise (2 cm a day as compared with 0.2 cm normally) until 20 August, when a pattern of areas of high water levels and low water levels in the vicinity of Wuyuan could be seen on the map. Between 20 August and 25 August (the date of the earthquake) this rather broken-up pattern shifted to a better-defined one, in which certain circumscribed areas had depressed water levels while the surrounding area had raised water levels. In the four hours before the earthquake the water wells showed rapid up and down fluctuations of water level. At the time of the quake, water spurted out of the wells in one location. After the earthquake, the water in some wells was disturbed, bubbled or showed rapid up and down motion.

AUTHOR: WANG Wanqing [3769 5502 7230]

ORG: None

TITLE: "Anomalies in Oil and Water Wells and the Tangshan Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 4, 1980 pp 41-43

ABSTRACT: Bin County, Shandong Province, has a complicated fault structure resulting from the interaction of a number of fault blocks. An examination of the behavior of oil wells in various oilfields located in faulting areas showed anomalies in 7 of them related to the Tangshan earthquake. Three wells (Nos 88, 101 and 102) showed sharp peaks in output within a month before the earthquake. One well (No 278) showed a sharp peak in the oil-gas ratio in April and July of 1976. There was a sharp increase in the water content of the oil produced by one well (No 285) in July. Finally, one well (4-X14-10) showed a decrease in the rate of change of static pressure, starting in March 1976 and achieving a plateau in June which persisted until October before the static pressure again began to change more rapidly.

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END

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4 November 1980

China Report

SCIENCE AND TECHNOLOGY

No. 66

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APPLIED SCIENCES

CASE ON STOLEN SATELLITE SECRETS REVIEWED

Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 pp 20-21

[Article by Gan Benfu]

> [Text] Arming spies with science and using them to steal scientific intelligence is one of the games going on quietly amid international struggles. The following is a glimpse....

One day in November 1978, a young man, 23 years of age, stood as the defendant in a U.S. Federal Court. His name was Kampiles, and he was a spy for the CIA. Strange as it seems, America was actually trying one of its own spies! As it turns out, Kampiles had sold a top secret document to a KGB agent of the Soviet Union for $3,000.

The document was a copy of the technical handbook for the U.S.'s KH-11 satellite. In his position in the Operations Center Oversight [Overhead] Group at CIA headquarters, Kampiles had access to this top secret material. Although during the course of the trial his defense attorney made a valiant effort to exonerate him, his argument was weak and ultimately to no avail. Kampiles was convicted of treason and sentenced to 40 years! This verdict caused quite a stir in the United States.

What makes one little handbook so valuable? Is there anyone who does not know that there are thousands of satellites floating through space? As it turns out, the KH-11 is not just another satellite. Developed in the United States, it is the most advanced spy satellite in the world today. It can detect and keep watch over the Soviet Union's military deployment, weapons tests, war preparations, and other such important secrets. Furthermore, it can transmit the information to the intelligence center in Washington on a timely basis. The Americans have, therefore, dubbed their newborn brainchild "Keyhole." This is as much as to say that it can see an opponent's secrets by peeping through the keyhole of a tightly locked "door." However, the information thus obtained must be studied and reviewed using various reference materials, and the purloined handbook was the most important part of this reference material. Reading it would tell you the technical capabilities of the KH-11; the intelligence collection mode and the mission of this spy slipping quietly overhead; and you could also use it to deduce what intelligence had already been gathered and the nature of the information intercepted. Furthermore, as long as this "keyhole" continued in operation, you could use phony set-ups to confuse it, so that the information seen by your opponents through this "secret" keyhole would be worthless. When you think about it, is it any surprise that this caused a public outcry and indignation in the court?

The Secret of 'Big Bird'

Actually, the existence of spy satellites has been an open secret for some time. Hostile parties or potential enemies know that their opponents can use satellites for various spy missions. The only things that are not clear are the specifics about each satellite, such as the purpose of the launch, instrumentation, true horizon, and the modes of obtaining and processing intelligence. Countries do not engage in as much reporting and bragging about their spy satellites as they do with their other spacecraft. On the contrary, agencies in charge do their best to maintain secrecy. For this reason, relevant information is often conjecture or analysis arrived at by relying on indirect means, or even on third party reports or commentary. The present article is no exception, and so it is difficult to avoid imprecision in the figures and some discrepancies in the examples. Nevertheless, it is still quite possible to make out some of the scattered pieces and get some idea of the overall picture.

From early in 1962 until 1970, America's spy satellites passed through three generations of improvement. Models utilizing recoverable film were used for detailed surveys, and had a resolution of 2-3 meters, which was raised to 0.6 meters, and a life of 2-3 days, which was raised to 10-15 days. Radio transmission models were used for broad surveys, and in addition to visible light photography they also used infrared scanners to maintain coverage at night and on overcast days. They also used multi-spectrum photography to recognize camouflaging. At the same time, because the life had been extended to 3-4 weeks, it was possible to reduce the number of launches. For example, in 1965 there were 13 launches, but by 1970 this was reduced to 4.

On 15 June 1971 the launch pad at Vanderberg Air Force Base was again a beehive of activity, as a 17-story behemoth towered on it. This was the Titan 3D launch vehicle and satellite complex, and it was carrying one of America's fourth generation spy satellites. Its official designation was a "low orbit observation platform," code number "467." Its unofficial name was "Big Bird."

This "Big Bird" was indeed worthy of the name. It stood 15.24 meters high, had a diameter of 3.05 meters, weighed 13.3 tons (including propellant), had a surface resolution of 0.3 meters, and was also capable of both detailed survey and general survey missions.

On that 15 June, at 11:41 a.m. Pacific Coast Daylight Saving Time, with a tremendous roar the rocket boosted "Big Bird" into orbit: perigee 184 km, apogee 300 km, angle 96.3 degrees, and periodicity 89.1 minutes. With this orbit, surface targets were repeated every 3 1/2 days, and with the orbit this low, in order to avoid reentering the atmosphere too early, the Agena engine was reignited once every 7-10 days thereby raising the orbit and extending its life. As a result, the first "Big Bird" was aloft 52 days.

"Big Bird" is manufactured by the Lockheed Company of the United States. It "sprouts" two sharp eyes. One eye, developed by the Perkin-Elmer Corporation, is a very high-resolution camera purportedly capable of distinguishing individual people on the ground. The other eye, developed by the Eastman Kodak Company, is a reconnaissance camera employing a new film scanning device. "Big Bird" carried six returnable film cannisters and can, at predetermined times and places, put the information it has picked up into the cannisters and return them to earth; these are picked up in mid-air by an HC-130 aircraft fitted with retrieval gear based with the 6594th experimental wing stationed in Hawaii. They are then flown to Andrews Air Force Base just outside Washington. From there, they are forwarded to the National Photographic Interpretation Center.

"Big Bird" is still shrouded in mystery. Some people speculate that it carries some even more mysterious observation devices. One source has it that it has a four- or six-phase multi-spectrum camera capable of seeing through camouflage and measuring minute changes in a target. Another source says that it carries highly effective infrared scanning devices for night surveillance and can detect the heat emitted from protective underground missile silos. Still others claim that the "Big Bird" uses television equipment and side-looking radar and a 6.1-meter extensible antenna capable of transmitting the intelligence it has picked up to its ground station in the brief 10-minute interval it takes to pass over the station. These stations consist of seven land-based stations and six tracking ships. The seven land-based stations are located at New Boston, New Hampshire; Vanderberg Air Force Base in California; Wallops Island, Virginia; Kodiak Island, Alaska, Guam, the Seychelles in the Indian Ocean and a certain country in East Africa.

Even more astonishing is the fact that "Big Bird" often carries "passengers" aloft. The first "passenger" carried was on 20 January 1972, when "Big Bird" No 2 was launched. It carried the "P-11" satellite to conduct electronic surveillance. This 0.3 X 0.9-meter octagonal satellite weighed approximately 57 kilograms; its orbit was 472 X 549 kilometers.

On the average, two "Big Birds" are sent aloft each year. The second "Big Bird" flew for 40 days, the third "Big Bird" to the sixth "Big Bird" for 2 to 3 months and "Big Bird-7" for 123 days. The first to carry two satellites, "Big Bird-10," survived for 150 days. "Big Bird-14," launched on 27 June 1977, survived 178 days, almost half a year.

New Partner on Stage

As one "Big Bird" after another soared aloft, a new partner appeared on stage. This was the unusual launch that took place on 19 February 1976. A Titan 3D took off from the Vandenburg launch pad carrying a new spy satellite into an orbit having a perigee of 247 kilometers and an apogee of 533 kilometers--twice as high as the ordinary "Big Bird." At first, it was categorized as a "Big Bird," but its unusual behavior made people suspicious. After 4 days, the orbit was changed to 341 X 535 kilometers and after 3 months it dropped to an orbit of 246 X 530 kilometers--a very strange bird indeed. This strange bird also carried two satellites, which had orbits of 236 X 535 kilometers and 253 X 531 kilometers respectively.

Simultaneously, it was discovered that the launching of this strange bird did not interrupt the flights of the "Big Birds." Six months later, "Big Bird-14" settled into an orbit of 155 X 239 kilometers. This was followed by "Big Bird-15" launched on 16 March 1978. Precisely 1 year later, on 16 March 1979, it flew into an orbit of 177 X 244 kilometers. It is said that the Americans plan to employ return-film satellites through the mid-1980s.

What, then, does this strange bird do? It turns out that it is a fifth-generation U.S. spy satellite developed by the TRW corporation with the code name "Project 1010," and a model designation of "KH-11."

Strategic requirements and technological progress are such that people are no longer satisfied with the film cannister retrieval method and the untimely method of receiving commands from and relaying information to the ground stations [only while] above the stations. People hoped to directly and instantaneously (in real time) see the target under surveillance. Therefore, the goal of "Project 1010" was to research a satellite reconnaissance system that would be capable of real-time imagery. To this end, KH-11 carries high-resolution television cameras and uses data relay satellites in synchronous orbit to relay this imagery. This information does not need to be disseminated to ground installations but is beamed directly to the "National Photographic Interpretation Center" in Washington where it can be analyzed and judged immediately and conveniently. This tremendously enhances the surveillance level of the spy satellite and makes today's spy satellite a "trump card." Kampiles' unexpected selling of the secrets of this trump card was a great embarrassment to his bosses.

After the first KH-11 had been aloft for 2 years and 40 days (four times the life-span of the ordinary "Big Bird!"), it was commanded to descend and burn up by the ground.

Today, the second [such satellite] is aloft. It was launched on 14 June 1978 from Vandenberg Air Force Base. It is in an orbit of 285 X 470 kilometers with an angle of 96.9 degrees. Its information passes in an unbroken stream through data relay satellites, transmitted in real time to Washington and straight into the hands of the U.S. Central Intelligence Agency.

However, after the uproar of the Kampiles case, in the offices of the Operations Center Oversight Group there is certainly another handbook with updated contents and perhaps the spies of the KGB are in the process of obtaining it.

CSO: 4008

LIFE SCIENCES

NEW ADVANCES MADE IN STUDY OF EXCEPTIONAL HUMAN FUNCTIONS

Shanghai ZIRAN ZAZHI [NATURE JOURNAL] in Chinese No 8, Aug 80 p 606

[Article by Zhang Feng [1728 7364], reporter of the Journal]

[Text] Since the First Scientific Symposium on Exceptional Human Functions was held in Shanghai last February, there have been some advances in various places in the study of exceptional human functions.

At present, schools of higher education where this subject matter is being studied include Beijing University, Beijing Teachers College, Wuhan University, Lanzhou University, Hangzhou University, Anhui Teachers University, Jilin Teachers University and Jiamusi Medical College. Special subject Research Groups have been established in most of these institutions, and the subject matter has been listed in the official research plan. Participants in the research include professors, assistant professors, other instructors and researchers in the fields of physics, biology, phychology, physiology, medicine, Chinese traditional medicine, education, etc. The special subject group at Hangzhou University includes, aside from instructors of the university, Professor Dong Taihe [5576 1132 0735] of Zhejiang University and Professor Wu Xiecan [0702 3610 3503] of Zhejian University of Medicine. The team in Jiamusi College of Medicine also receives the cooperation of such units as Harbin Industrial University, Harbin College of Shipbuilding, etc. The research group of the Institute of High Energy Physics Chinese Academy of Sciences has Xu Jianming [1776 1696 6900] as its chairman and Zhao Zhongyao [6392 1813 1031] as a consultant, and its members also include many famous scientists. Beijing University started to study the subject relatively earlier than the others. During the period of the May 4 Scientific Symposiums, a special report meeting on the subject of human exceptional interaction and functions was held, under the chairmanship of Professor Zhao Yibing [6392 0110 3521]. Many old scientists, such as Professor Wang Dezhao [3076 1795 2507], director of the Institute of Sonics Chinese Academy of Sciences, and Professor Zhao Zhongyao, deputy director of the Institute of High Energy Physics were invited to participate. Seven reports were read by Chen Shouliang [7115 1343 5328] Wang Chu [3769 2806] and He Muyan [6320 1970 0917], and were positively received by the specialists, invited and of the university, who were present at the meeting.

Some research groups have also been organized at the province and city level. The Shanghai Municipal Human Exceptional Functions Research Society was established on 21 July. The Beijing Municipal Research Group is participated in by related scientists of more than 20 units, including institutes of physics, biophysics, high energy, psychology, etc. of the Chinese Academy of Sciences, etc. Jilin Province has established a cooperative group of research, with related persons of Jilin Teachers University, Baiqiuen University of Medicine, Changchun College of Chinese Traditional Medicine, the Institutes of Optical Instruments, Applied Chemistry, Chinese Academy of Sciences, and the Air Force Hospital, etc. participating, and with the secretary of Jilin People's Government Long Wenyu [7893 2429 1342] as the adviser.

Chungqing City has established a Human Exceptional Function Scientific Research Society, with scientists of Chungqing University, the Third Military University of Medicine, Chungqing College of Medicine, Institute of Laser, Institute of Radio, and Institute of Chinese Traditional Medicine participating. Yunnan Province established the provincial level Exceptional Functions Research Leadership Team, with Chief of the Provincial Bureau of Public Health Zeng Yusheng [2582 5148 3932] as the director, and comrades of Yunnan University, Yunnan College of Chinese Traditional Medicine, Kunming College of Medicine, Kunming Institute of Physics, and several hospitals all participate in this work. At present, a national human exceptional function research society is being prepared.

One very obvious characteristic of the scientific research on human exceptional functions in the various places in the past months is the fact that the key point of research has turned from verifying the existence of this type of functions to planned and purposeful observations and studies and experiments of various ways so as to look for the mechanism and principle. It is particularly significant that some units have begun to use modern scientific instruments to proceed with tests of children possessing such exceptional functions, and test of certain parts of their bodies have manifested some anomalies.

Professors Chen Shouliang [7115 1343 5328] and Wang Chu of Beijing University first suggested the problem of universality. That is to say that this type of exceptional functions must be to a certain degree universal among children of about 10 years of age and, moreover, they may be induced to produce. This [hypothesis] has been verified in many places. Last spring, Yao Hongjun [1202 7703 6874], an engineer of the automobile repair shop of the Jilin Provincial Bureau of Coal Industry, conducted an experiment at the dormitory and discovered that more than 30 children, including his own, all have this type of functions. Dong Zhenjun [5576 2182 0689] et al of the Department of Computer Science, Wuhan University carried out an experiment in one class of the third grade in the experimental elementary school of Wuhan University. Of the 57 students of the class, 12 students were at once discovered to possess such exceptional functions. In one class of Liuanlu Elementary School of Hefei City, 15 percent of the students were found to have exceptional functions. Sensory transmission, remote sensing, X-ray vision etc, which were originally regarded as rare functions have now been proved capable of being produced through induction and training.

Furthermore, the experiments carried out at Yunnan College of Chinese Traditional Medicine have disclosed that children with exceptional functions are often "Jingle sensitive persons." When this type of function is utilized to recognize images, the "transmission pathway" coincides more or less with the Jingle [meridians] in the Chinese traditional medical theory. From this discovery, it is proposed that the mechanism of human exceptional functions and the Jingle Theory may have a close relationship. Hubei College of Chinese Traditional Medicine Hospital used medical instruments to examine the 105 patients who had been observed with "x-ray vision" by Xie Chaohui [6200 2600 6540] and produced results that basically coincide with the results of his exceptional function. A new aspect has thus been opened in the research on the applications of these functions. Currently, the work in this aspect is being continued.

Since February, through extensive propaganda and induction, many children (some adults) with exceptional functions have been discovered in various places. In such places as Shanghai, Nanjing, Tianjin, Zhejiang, Gansu, Jilin, Liaoning, Yunnan, and Nei Monggu where there had been no discovery of persons of exceptional functions, some have been discovered in all these places, most recently. One was discovered among the sailors of the navy as well. Most recently, it was discovered that some children can read books with their ears. When one of these children was told to "listen" to a certain line of a certain page of a certain book, he could "listen out" the words of that line. Even when the book is locked in a suitcase, he still can "listen out" the words of a certain line on a certain page of a certain volume. Dong Wenbao [5576 2429 6283], a member of the Huishui County Science Committee, discovered that he and his 5-year-old son have something which he calls a "thought transmission" function between them. That is to say when the father thinks about a number (maybe a multiple digit, an equation, or a letter of the alphabet) in his head, the son can feel it at the same time and write it out immediately. These strange discoveries are awaiting serious studies in the future.

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CSO: 4008

SCIENTISTS SUPPORT DISCIPLINARY ACTION IN BOHAI SINKING

Beijing GUANGMING RIBAO in Chinese 27 Aug 80 p 3

[Text] Correspondents Lu Jianming [7120 1696 2494] and Xie Jun [6200 6511] report that China's renowned bridge specialist and president of Tongji University, Li Guohao [2621 0948 6275], and the director of the Shanghai Institute of Silicates of the Chinese Academy of Sciences, Yan Dongsheng [0917 2639 3932], who is also a member of the Commission for Inspection of Discipline, have issued statements in support of the decision of the State Council concerning the Bohai No 2 accident.

Li Guohao said excitedly that the stern action taken by the State Council concerning the accident in which Bohai No 2 overturned and sank is extremely necessary. The large ship capsized and sank, and 72 persons died tragically. The leaders of the Ministry of Petroleum cannot evade responsibility, he told the reporters, recalling the fact that at a group meeting of the Second National Conference of the China Science Society, a delegate pointed out that the high indices previously proposed by the Ministry of Petroleum for petroleum industry development within a short period of time was not a factual or scientific approach. That delegate was immediately reproached by a deputy minister of the Ministry of Petroleum. That deputy minister said, arrogantly: "Don't keep stirring up muddy water. What we need is iron will and brave ambition. We never followed Li Siguang's [2621 0934 0342] theory to look for oil. Did we find it, anyway?" The delegates felt uncomfortable and they all said: "The leaders of the Ministry of Petroleum cannot bear to hear different opinions, even at a scientific meeting. Their authoritative attitude during ordinary times can easily be imagined." Li Guohao said: "The decision of the State Council, of course, does not concern the Ministry of Petroleum alone. It is meant as a warning for all antiscience bureaucrats in all departments. It is a guarantee for us to reorder our thoughts and attitudes to be in tune with the four modernizations. It is hoped that our leaders and cadres will pay more attention to the opinions of scientists, specialists, and the masses when they make decisions about important things, that they will do things according to scientific principles, and that they will think more about the interests of the people and will not spend human lives as if they were just "tuition."

Yan Dongsheng indicated to the reporters that he enthusiastically supports the decision of the State Council. He said: "The Bohai No 2 incident gave people a far-reaching lesson. The lesson is that the leaders of the Ministry of Petroleum regarded their own opinion as law and would not allow anyone else to present a different viewpoint. Therefore, they necessarily received the punishment of objective principles and caused the state and the people to suffer heavy losses. If this patriarchal style of doing things is not changed, the four modernizations will have no hope. This sort of thing is not limited to the Ministry of Petroleum; it exists in other departments as well. The comrades of some departments do not do things from the viewpoint of objective reality and possibilities. They disregard the objections of technical specialists and casually make momentous decisions, causing people's labor and money to be wasted and unduly delaying our enterprises. For example, there have been construction projects with investments amounting to several hundred million or even several billion yuan, but after the structures were completed, there was no way to supply electricity, water, or raw materials. They just became useless packages. They must know that this investment capital is accumulated by the people, who have saved by eating and wearing less. This type of not appreciating the wealth created by the laboring people and throwing it away and wasting it is really very regretable behavior. This sort of thing just cannot be allowed to continue.

6168
CSO: 4008

SCIENTISTS SHOULD HAVE LEADERSHIP ROLES IN RESEARCH WORK

Guangzhou NANFANG RIBAO in Chinese 22 Aug 80 p 2

[Article by Liang Jia [2733 0857], party organization secretary and director of the Guangzhou branch of the Chinese Academy of Sciences: "Let Experts Have Leadership Authority Worthy of the Name"]

[Text] Currently, party leadership in scientific research units is being strengthened and improved, but the problem that urgently requires a solution is how to develop and utilize fully the function of specialists in scientific research work. Specialists are good, at scientific research work, and they should be allowed to have true leadership authority, to have the power to command, and to be real commanders in name as well as in reality. [The system] must be such so that where there is a job, there is authority and there is responsibility.

The Central Committee has clearly stipulated that a system of responsibility of directorship under the leadership of the party committee should be implemented in scientific research organizations. At present, organizationally, this leadership system has been carried out among the scientific research organizations belonging to the Guangzhou branch of the Chinese Academy of Sciences and the Guangdong Provincial Academy of Sciences, but to what extent the function of the skill of the specialist can fully be developed remains dependent upon a serious summarization of experience to be gained from practice. The skill of some specialists has not yet been fully utilized, and their forceful leadership in scientific research work has not yet been established in reality. According to my understanding, this condition is manifested in the following three forms: 1. The party committee has taken on too much. Nothing counts unless the party committee secretary nods his head. The director has no real power. 2. The specialists must participate in every type of work, regardless of its importance; in some cases they are even pushed to do whatever job there is. This condition makes it appear as if the function of the specialists is being fully utilized, but in reality specialists have become bogged down in housekeeping details and have no way to concentrate their efforts on doing a good job of guiding scholarship and managing scientific research. 3. Some are constantly picking at the specialists with regard to their work, their words, and their actions, and demanding that they be perfect; therefore, the specialists feel they must be very careful about everything, and they have no way to perform their work with full confidence. The above three situations amount to bondage, regardless of the subjective motivation. These situations prevent the specialists from giving free rein to the direction of scientific research.

I believe that if the function of the specialists cannot be fully utilized in any scientific research unit, or if the specialists cannot function fully in the matter of producing research results or of producing persons of talent, then the problem of strengthening and improving party leadership has not been satisfactorily resolved. If the party leadership is to be strengthened and improved, then the line, methods, and policies of the party must be seriously learned in accordance with reality, so that the work of political ideology and the correct style of the party are upheld and the socialist positive nature of the vast majority of scientific research persons, cadres, and workers is fully developed and they can contribute diligently to produce results, produce persons of talent, and achieve the four modernizations. In light of this content and this goal, a full development of the function of specialists is required by the policy of the party and is also necessary for scientific research; therefore, this should be an important aspect of strengthening and improving party leadership.

At present, in some scientific research units where the function of specialists cannot be fully developed, there is the major aspect of weak party committee work. The specific reasons are generally as follows: 1. Ideologically speaking, there is insufficient understanding of the importance of the leadership function of specialists in scientific research work. A few comrades are worried that the specialists cannot handle [leadership] and do not dare to hand over the power of command in research. 1. There is the aspect of habit—i.e., it is the habitual method of work to have the party take charge of everything. Some specialists also have the habit of asking the party committee for directions about everything and do not dare take charge. 3. With respect to specific measures, a set of measures and a system that will guarantee the practice of allowing the specialists to lead and command have not yet been formulated. A rear guard support system also should be strengthened, so that specialists will not have to worry about little things; otherwise, even if the problem of ideology is resolved, the work will not be carried our satisfactorily.

Besides, when specialists are to be assigned as directors, sufficient consideration must be given to those comrades who have special scientific and technological knowledge as well as organizational and leadership ability. If some specialists who have academic skill but no leadership ability are placed in positions of leadership, it would amount to forcing them to do what they cannot do. This would not be favorable for the development of their specialized skills.

For the purpose of strengthening and improving the leadership of the party, party workers in scientific research units must intensify their efforts on the problem of full development of the function of the specialists. Through tenacious work of political ideology and powerful measures, the party committee must generate the positive in the specialists to the fullest and help and support them in establishing true leadership and command authority in scientific research work, under the guidance of the party's line, policies, and goals and under the collective leadership of the party committee. At the same time, party workers must carry the party's work in political ideology to the work of business, so that in the minds of the scientists and technicians there is no wish to avoid problems but, instead, a continuous desire to use their special methods to resolve new problems that are forever coming up. This is where our responsibility lies.

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[Excerpt] Papers

A General Method for Calculating the Mean Square Electric Dipole Moments and the Mean Square Lengths of Polymeric Chains......He Fucheng [0149 4395 1004], Department of Chemistry, Chengdu University of Science and Technology (1)

The Primary Radical Termination in the Photopolymerization of Methyl Methacrylate......Yu Tongyin [0060 0681 7148], Wang Lihui [3769 4539 1920] and Bu Haishan [0592 3189 1472], et al, all of the Department of Chemistry, Fudan University (10)

Terpolymerization of Epichlorohydrin, Ethylene Oxide and Propylene Oxide......Xie Hongquan [6200 3163 3123], Zhu Jiang [2612 3068] and Liu Xiuxiang [0491 4423 3276], all of the Institute of Chemistry, Hubei Province (16)

Studies on the Lowering of the Spinning Temperature of Polypropylene by Adding 4-Hydroxy Tetramethyl-piperidine-1-oxyl......Hou Xiaohuai [0683 2556 3232], Fan Yuxiang [2868 1342 4382] and Shen Dekang [3088 1795 1660], all of the Institute of Chemistry, Chinese Academy of Sciences (22)

The Morphology and Extension Behavior of cis-1, 4-polybutadiene Rubber......Zhou Enle [0719 1869 2867], Xu Bailing [1776 4101 3781] and Jia Lianda [6328 6647 6671], all of Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (27)

Characterization of the Structural Features of the Poly-p-phenylene Terephthalamide (PPTA) Films by the Light Scattering Method......Hu Shiru [5170 0013 1172] and Xu Mao [1776 2021],

both of the Institute of Chemistry, Chinese Academy of Sciences (35)

Study on Birefringence of Biaxially Hot-Stretched Acrylics by Using Convergent Polarized Light......Lu Xici [0712 6932 1964], Department of Modern Chemistry, Chinese University of Science and Technology; Luo Hezhang [5012 0735 3864], the Chemical Industrial Institute of Jinxi (45)

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Study of the Molecular Weight Distribution of the Epichlorohydrin Elastomer by Means of a Simple GPC Column......Li Miangui [2621 4875 6311], Fu Gongcheng [0265 0501 2052], Cao Haitian [2580 3189 3944] and Xie Hongguan [6200 3163 3123], all of the Institute of Chemistry, Hubei Province (65)

The Stereoregularity of Poly-2, 2, 3, 3-Tetrafluoropropyl Methacrylate......Tian Yulin [3944 6657 7207], Zhou Gengyuan [0719 1649 0337] and Li Zexin [2621 0463 0207], all of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (73)

The Study on Poly(tetramethylene terephthate)-Poly(tetramethylene ether) Multiblock Copolymer......Wu Meiyan [0702 5019 8826], Shi Manli [2457 2581 7787] and Cheng Youqing [4453 0645 7230], et al, all of the Institute of Chemistry, Chinese Academy of Sciences (77)

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NWG--A Porous Silica Microsphere Packing for High-Performance GPC......Chai Zhikuan [2693 1807 1401], Institute of Chemistry, Chinese Academy of Sciences; Sun Yueming [1327 2574 2494] and Pang Zhilong [1690 1807 7893], both of the Second Chemical Reagent Works of Tianjin (134)

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The Deformation of Polyethylene Spherulites during Uniaxial Drawing (III)......Li Lisheng [2621 2980 3932], Zhang Guangli [1728 1684 0448] and Li Enwen [2621 1869 2429], all of the Department of Chemistry, Beijing University (159)

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The Determination of Residual Monomers in Poly-N-Vinylcarbazole by GPC......Ye Meiling [5509 5019 3781], Wang Jianfang [3769 1696 7089] and Shi Lianghe [2457 5328 0735], all of the Institute of Chemistry, Chinese Academy of Sciences (168)

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Static Solutions of Yang-Mills-Higgs-Kibble Systems...... S. Deser (Permanent address: Department of Physics, Brandeis University, Waltham, MA 02254, United States) and C. J. Isham, both of Blackett Laboratory, Imperial College of Science and Technology, South Kensington, London (716)

A Parametric Representation of Quasi-Conformal Extensions...... He Chengqi [0149 2052 1142], Fudan University (721)

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Asymmetric Reduction of Steroid Intermediate by Microorganism ......Zhou Weishan [0719 4850 0810], Huang Dazhong [7806 1129 0022] and Wang Zhongqi [3769 6945 7784], all of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (741)

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Fission Track Dating of Peking Man......Guo Shilun [6753 1102 0243], Zhou Shuhua [0719 2579 5478] and Meng Wu [1322 2976], et al, all of the Institute of Atomic Energy, Chinese Academy of Sciences; Liu Shunsheng [0491 7311 3932], Zhang Feng [1728 1496], Hu Ruiying [5170 3843 5391] and Liu Jingfa [0491 0079 4099], all of the Institute of Geochemistry, Chinese Academy of Sciences (770)

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AUTHOR: LYU Wenchao [0712 2429 6389]

ORG: Qinghua University

TITLE: " Properties of DJS-140 Computer System Introduced"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 pp 6-9

ABSTRACT: The research of the DJS-140 computer system has been successfully completed in May 79 and its function and stability have been inspected and certified. It is now in the process of being manufactured by the factory. The computer system has a complete system hardware and software, with an extended storage capacity of 256KB, an 8-unit control terminal, magnetic disk, magnetic tape, a clock, a multi-path switching device. It is equipped with RDOS, MRDOS, and various languages (FORTRAN IV, FORTRAN V, Multi-user extended BASIC, extended ALGOL-60, etc.) Details of the hardware system, the operation system, and the language system are described.

AUTHOR: SUN Zhihui [1327 1807 2264]

ORG: Nanjing College of Engineering

TITLE: "Program Language FORTRAN IV of the DJS Series Electronic Computers"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 pp 25-27, 35

ABSTRACT: FORTRAN IV is provided in the system software of the DJS100 series of computers made in China. At present, the certified portion provided to the users is the 12K SOS system, with ISO FORTRAN IV as the standard and many extended functions in many aspects. The DJS100-FORTRAN programming characteristics are explained.

AUTHOR: HUANG Shuji [7806 2579 1015]
WU Gongyi [0702 0501 1355]

ORG: None

TITLE: "On Microwave Range Finding"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 pp 36-38

ABSTRACT: Microwave range finding technique is now more than 20 years old, and with infrared and laser rangefinders, microwave rangefinder has become a tool commonly used in long distance distance measurement. China began to research on making microwave rangefinders in 1958. At present, several plants, research institutes, and schools of higher education have made several types and these products are being developed in the direction of miniaturization, solid state, and dynamic surveying. The technology, characteristics, and work theory of microwave rangefinders and their current condition of development are discussed.

AUTHOR: ZHENG Yixin [6774 0001 2450]

ORG: Beijing Bureau of Electrical Meters

TITLE: "Obvious Results of Reforming the Diffusion Furnace"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 p 13

ABSTRACT: High temperature diffusion furnace is a major equipment for the production of semiconductor devices. Due to its high power consumption, it was known as "electricity-eating tiger." Beijing Semiconductor Instrument Third Plant studied and carried out 2 reforms. First, the plant made a temerature control device to raise the control precision from ±1°C to ±0.5°C, and added new insulating materials to replace the old. The constant temperature consumption rate was reduced from 3.7 kw to 3 kw. The second reform involved the adoption of the far infrared heating technique by changing the original pipe into a far infrared heating pipe. This change reduced the constant temperature power consumption from 3 kw to 1.8 kw.

AUTHOR: None

ORG: None

TITLE: "Front Cover Explained"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 3, 80 p1, front cover

ABSTRACT: The front cover of this issue is a photo depicting the E3251-E3256 microwave frequency automatic displacement device. When it is combined with the E325 counter, it can automatically, quickly, and highly precisely measure microwave frequencies of 300MHz - 60GHz. The sensitivity of the instrument at 200 μ W is 300MHz - 12.4GHz; at 500 μW it is 12.4-60 GHz. The degree of accuracy is 3 x 10^{-9} days.

6168
CSO: 4009

AUTHOR: HUANG Shiji [7806 0099 2623]

ORG: None

TITLE: "Developmental Trends in Color Television"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 2-5

ABSTRACT: At present the number of television sets in the world has exceeded 400,000,000 and 150,000,000 of these are color sets. Since color TV began to be broadcasted in USA in 1954, the number of color sets has grown continuously and this growth in production has necessarily promoted a rapid technological advancement. During this period, TV sets have gone through electron tube sets, to transistor sets, to integrated circuit sets. The degree of integration of color TV sets of today has become very high; aside from the tuner, the visual output, the travelling wave deflection, and power source adjustment, integrated circuits are used for all remaining. In Japan, the degree of integration has surpassed that of USA and Western Europe. An entire color set in Japan is now put together with 4-5 chips of medium scale integrated circuits (MSI); it is estimated in the future 1-2 chips of large scale integrated circuits (ISI) will be sufficient. The number of periperal components has been reduced from the 800 to 300 now, and further reduction is expected. The rapid development from semiconductors to integrated circuits in color TV is reviewed. A list of Chinese names for various automatic circuits is attached

AUTHOR: JIA Shilou [6328 0013 2869]

ORG: Harbin Industrial University

TITLE: "Carrier Wave Recovery Technique in Time-division Multiple-address (TDMA) Digital Satellite Communication"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 6-8, 22

ABSTRACT: In time-division multiple-address satellite communication, the carrier waves transmitted by the earth stations of various places are not coherent. With a frame cycle, a given receiving earth station receives carrier signals from other transmitting stations, and must be able to be able to extract, quickly and accurately carrier signals of each station. At present, there are 2 techniques for recovering coherentsignals of separate frames of each transmitting station: one is to use a fast locked phase loop or narrow band filter to trace and extract carrier signals of each station; the other is to use multiple locked phase loop to trace and extract carrier signals of various stations respectively. These methods are described in separate sections in the paper.

AUTHOR: WANG Xianggui [3769 4382 6311]

ORG: Institute of Semiconductor Research, Chinese Academy of Sciences

TITLE: "Testing Large Scale Integrated Circuits"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 9-13

ABSTRACT: The history of development of integrated circuits indicates that improvement in circuit designing and the manufacturing technique as well as the testing and analysis of integrated circuits must be coordinated if integrated circuit technology is to develop rapidly. As the degree of integration is higher, the ratio of number of components and pins is further increased and the problem of testing is further complicated. While at the same time, the quality of the integrated circuits must be improved as well to present an even higher requirement for better testing techniques and instruments. This paper describes the available testing techniques and instruments. There remains a need to simplify the testing method and the equipment, however. The author believes that testing large scale integrated circuits is a complicated problem for which a satisfactory solution is not yet available here or abroad.

AUTHOR: LI Youhao [2621 0645 3185]
YANG Baoshan [2799 1405 1472]

ORG: None

TITLE: "Today's Permanent Magnetic Materials"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 18-19

ABSTRACT: Permanent magnetic materials supply constant magnetic fields to components without the need for additional energy; they are therefore important electronic and electrical materials. They are also expected to be extensively applied in transportation, ore selecting, and waste water treatment. In the past century, the property of permanent magenets has been improved more than 100 fold. Currently, 3 types are being used in large quantities: lead-nickel-cobalt permanent magnets, iron oxide permanent magnets, and rare earth cobalt permanent magnets. This paper describes advancements of the 3 major types of permanent magnetic materials separately and discusses the trends of development of these materials.

AUTHOR: HUANG Songru [7806 1529 1172]

ORG: Chengdu College of Telecommunication Engineering

TITLE: "Analysis of the Loop Transmission Function of Transistor Feedback Amplifier"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 25-27

ABSTRACT: It is known that the property of a negative feedback amplifier is determined by its loop transmission function $A_v B_v$ or $A_i B_i$. This paper proves theoretically that of a given negative feedback amplifier, as far as bipolar transistors are concerned, its loop voltage transmission function $A_v B_v$ equals its current transmission function $A_i B_i$. First the "dual network"method of Hakim, S.S. is improved to make it more suitable for general theoretical analysis of transistor negative feedback amplifier before the classic method is used to prove the equivalent relationship of the 2 types of loop transmission functions. Finally, applications of this relationship are explained.

AUTHOR: (1) ZHAO Baojing [6392 0202 4842]
LU Minfeng [6424 3046 1496]
(2) CAO Ying [2580 5391]

ORG: (1) None; (2) Northwest Material Supply Station, Fourth Ministry of Machines

TITLE: "(1) Introducing China Made TTL Digital Integrated Circuit Products--(IV) Latch; (2) Recommending Two Types of New Materials"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY] in Chinese No 5, 80 pp 39-40

ABSTRACT: (1) Judging from the structure, Latch is a type of synchronous latch trigger, used mainly as a temporary register. In principle, anything that can utilize clock pulse action to store data in a trigger circuit may be used as a latch. A table is given listing 6 types of TTL intermediate spped, high speed, and very high speed latch products made in China. The circuit form, the work theory, the property characteristics, and the applications are discussed. (2) Two types of new materials recommended in this short item include: (a) 160 denatured aluminum alloy, a possible substitute for brass: When it is used in the place of brass to make electronic componensts,corrosion preventive measures may be eliminated, the weight of the product is reduced so is the cost. The material may be supplied by Northeast Light Alloy Refining Plant. (b) A conduction adhesive to replace silver or aluminum solder iron: It is made by Shanghai Synthetic Resin Institute. Problems of deformation, corrosion, etc. of soldered parts may be resolved with this adhesive. Major technical indices of the glue are given.

AUTHOR: LIU Zuolin [0491 0155 7207]

ORG: None

TITLE: "Using Red Slush to Make Silicon-Calcium Complex Fertilizer"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 p 19

ABSTRACT: Red slush is the waste slag of the aluminum refining process. Using it to make fertilizer is a new way of resolving the problem of disposing it as well as providing agriculture a new source of fertilizer. It contains a large quantity of silicon and calcium, and other elements and trace elements useful for the growth and development of plants. It contains less than 2 PPM of harmful cadmium, less than 0.1 PPM of mercury, less than 0.01 percent of nickel, and less than 0.02 percent of chromium; therefore, all these harmful contents are below the regulated limit for farm fertilizer. The slurry should first be dehydrated and then dried in a low temperature oven of 120°-300°C to activate before grinding. This is all it is required to make it into fertilizer. Field tests have proved its effectiveness in promoting the growth of crops, strengthening their adversity resistance, and reducing soil acidity. It is good for rice, wheat, corn, peanuts, and melons alike.

AUTHOR: XIANG Shunji [7309 7311 4764]

ORG: None

TITLE: "Reclaiming Gold From the Cyan-containing Liquid Waste of Gold Plating"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 20-21

ABSTRACT: In the gold plating process, pure gold is generally dissolved in a potassium cyanide solution to form aurous potassium cyanide, in which gold plating is accomplished. Afterwards, the solution is turned into a liquid waste containing gold and cyan. This paper describes 2 ways, the scorching method and the metal substitution method, of reclaiming crude gold from this liquid waste. The process of refining the crude gold is also told.

AUTHOR: GU Dingyan [7357 7844 6056]

ORG: None

TITLE: "Efflux Aeration Treatment of Waste Water of Textile-dyeing Process"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 22-24

ABSTRACT: Anlu 57 Cotton Spinning and Weaving Plant of Hubei Province used an efflux aeration tank of activated mud to treat the waste water of the dyeing process of knitted textiles. The technique was officially in operation in Oct 77. Since then, it has proved to have stable effect. The tank is easily maintained and the work process is simple. The waste water contains soda, organic matter of cotton fibers, dyestuff, activating agent, and detergent. After treatment in the tank, the water is found to meet the standard for disposal. The structure of the tank and the treatment procedure are described.

AUTHOR: None

ORG: Ozone Research Team, Environmental Engineering Teaching and Research Group, Qinghua University

TITLE: "Ozone Oxidization Method of Deep Treatment of Liquid Waste of Oil Refining Process"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 27-29

ABSTRACT: Beijing Dongfanghong Oil Refinery treated its waste water in 2 stages of flotation and aeration. The resultant water had a better quality than the industrial 3 wastes disposal standard of the state, but did not reach the quality standard of ground surface water, neither was it good enough to be used again for oil refining. A third stage of ozone oxidization was therefore adopted. Small and intermediate tests proved that with the third stage treatment, the water quality may reach, or be close to the standard for ground surface water. Compared with techniques of activated charcoal absorption, electrochemistry, and thin film, the ozone oxidization has the advantages of being fast reacting, free of secondary pollution, free of transportation and storage problems, easy to control and adjust, and simpler. The procedure and required equipment are described.

AUTHOR: ZHAO Ruifu [6392 3843 1133]

ORG: None

TITLE: "Remote Sensing Monitoring of Petroleum Pollution of the Oceans"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 30-32

ABSTRACT: Many materials on the earth reflect and absorb the sunlight at a given frequency and produce an electromagnetic radiation to form a wave spectrum signal related to the characteristics of a given material. For this reason, when the signals received by a remote sensing detector are analyzed, different types of materials may be distinguished. This paper explains how ultraviolet remote sensing, visible light remote sensing, heat infrared remote sensing, microwave remote sensing, or laser fluorescence remote sensing can be used to monitor the condition of oil pollution of the oceans. Merits and shortcomings of these techniques are discussed.

AUTHOR: HAO Dewen [6787 1795 2429]

ORG: None

TITLE: "Several Problems in the Assessment Aspect of Heavy Metal Pollution of cropland"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 36-37, 35

ABSTRACT: Problems of assessing heavy metal pollution of farm land are discussed in the paper in 3 parts: The first part deals with the problem of natural content of heavy metals of soils and crops. Heavy metal contents of soils and crops vary from place to place to cause it to be difficult to determine the base or non-polluting level. The second part deals with the various degrees of heavy metal pollution. In the early stage of soil pollution, there is generally no physiological effects on crops and there may be no yield reduction. The degree of pollution is expressed in the complex relationship between the soil and the cropplant and the rate of yield reduction may be used as one of the indicators only. The third part deals with equations used for computing the pollution index of individual heavy metal and those used for computing compound pollution index of soil and crops.

AUTHOR: ZHANG Heng [1728 1854]

ORG: None

TITLE: "A Bionic Agricultural Drug--Shachongshuang"

SOURCE: Beijing HUANJING BAOHU [ENVIRONMENTAL PROTECTION] in Chinese No 4, 80 pp 43-44

ABSTRACT: Guizhou Provincial Institute of Chemical Engineering Research succeeded in making Shachongshuang. It belongs to the clam-worm toxin type insecticide, a bionic drug. Skin and mucous membrane tests on white mice and rabbits disclosed no harmful effects on the animals. When it was used to control hog lice, the skin of the hog showed no damage whatsoever and the hog did not stop feeding. Tests also showed that the drug did not accumulate in the body of the treated animal. Nationwide tests in 21 provinces and cities demonstrated it to be an effective insecticide on more than 50 pests of rice, corn, wheat, soybean, rape, fruit trees, and sugar beets. Under normal conditions, only 50-75 g of the drug per mu in dilution for one spray is needed to produce good results. At present, about 20 plants in the country are preparing to manufacture it.

6248

CSO: 4009

AUTHOR: None

ORG: Crankshaft Section, Beijing Internal Combustion Engine General Plant

TITLE: "Let Old Equipment Wakens Up Their Fresh Capability by Means of Quality Control"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 pp 8-11

ABSTRACT: This article reports how an old quadric crank rough-processing tool of Beijing Internal Combustion Engine General Plant, has reduced its diesel engine crankshaft rejected products from 29.77% of October 1978 to 14.24% in June 1979 through exhaustive quality control analysis , and corrections. The main reason of the rejection was found to be that the crankshafts were not round due to mechanical defects. The process of the quality control analysis introduced includes: 1) finding of existing key problems by study by all levels concerned; 2) ascertaining of the causes of the problems; 3) the singling out of the more influential factors; 4) the making of counter-

[Continuation of ZHILIANG GUANLI No 1, Feb 80 pp 8-11]

measure plans; 5) the execution of the plan; and 6) the final checking of the results.

AUTHOR: None

ORG: Spark Plug Workshop Die-casting Section, Nanjing Insulator Plant

TITLE: "Enhancing of Product Quality from Execution of Scientific Control"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 p 13

ABSTRACT: This article introduces the experienceof how the die-casting section of the Spark Plug Workshop of the Nanjing Insulator Plant had applied scientific control to improve the quality of their products. On the basis of strengthening the constructiveness , self confidence and sense of responsibility of workmen at all levels to participate in the management, and enthusiasm of learning modern advanced experiences, six "must be done" are developed to ensure good quality, namely: 1) timely calculation of quality index performance; 2) analysis of quality and performance; 3) insistance of quality priority; 4) strict control of working conditions; 5)refuse die-casting to specified conditions; and 6) attain satisfaction to all concerned.

AUTHOR: GAO Fenglin [7559 7364 2651]

ORG: This Journal

TITLE: "Investigation on Process Capability and Machinery Capability"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 pp 10-24, 11

ABSTRACT: This article introduces the general knowledge concerned with the investigation of process capability and machinery capability that includes: 1) the definition of process capability and machinery capability; 2) the collection of data for process and machinery capability investigation, and how to judge process conditions; 3) calculation of process capability and machinery capability; and 4) judgement and treatment of process capability. Other articles in this concern will be continued.

AUTHOR: None

ORG: This Journal

TITLE: "Quality Control is Technical Innovation"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 1, Feb 80 pp 25-26, 32

ABSTRACT: This article is a translation from a Japanese author by Dunq Mu [0392 2606]. Starting from the advances to jet airplanes, the article discusses the conditions of technical innovations, and the coincidence of quality control to the conditions.

AUTHOR: WANG Hu [3769 3725]

ORG: Harbin Cement Plant

TITLE: "Ring-Chain-Guarantee in the Industrial Production of Cement"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3, Jun 80 p 7

ABSTRACT: The author analyzes how the Harbin Cement Plant has advanced since the last two years adoption of a quality control system. Based on strict analysis and examination of the finished products, assurance of ample raw material supply , and adoption of large flow processing, a ring-chain-guarantee system was developed that coordinated the eight key links of the production chain to attain process equilibrium, quality guarantee of each link, prior-control of raw material quality, checking of quality fluctuations, adoption of PDCA cycle,and efficient information transference. One of their product, the "Swan" brand cement, was commended by the State Council in 1979. The plant was founded during the Japanese-occupied Manchuria eara.

AUTHOR: YUE Guang [2588 0342]

ORG: This Journal

TITLE: "All Enterprises are Stirring Up to Put the 'Provisional Law' into Execution"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3 Jun 80 p 13

ABSTRACT: This article reports how the entire nation has actively supported the "Industrial EnterpriseComprehensive Quality Control Provisional Law" enacted by the State Economic Commission in March 1980. The supports cited include promotion of quality control conferences, plannings and education throughout all levels of industrial enterprises, and some achievements attained so far. The provisional law was drafted on the basis of quality control experiences of Chinese industrial enterprises during the last 30 years with due references to the modern advanced systems and methods abroad to meet the requiremnt of comprehensive quality control systems and methods in China.

AUTHOR: CAI Guoan [5591 0948 1344]

ORG: Xian City Economic Committee

TITLE: "Education on Quality Control in Xian City Achieved Primary Success"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3, Jun 80 p 23

ABSTRACT: The promotion of overall quality control system by the Xian Economic Committee has spread fundamentally to every staff of all experimental point enterprises by the end of 1979. The program is characterized by its initial education among party and administrative leaderships, training of experimental point core members, compiling and popularizing of educational materials specific to the characteristics of different industries, and paying special attention to experimental points

AUTHOR: None

ORG: Technical Information Office of National Capital Iron and Steel Mill

TITLE: "Application of Analytical Methods in Quality Control"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] No 3, Jun 80 p 25

ABSTRACT: This is an excerpt translation of an article originally published in the Japanese journal "Standardization and Quality Control" No 1, 1979. The article reviews the ever increasing application of such analytical methods as orthogonal imaginery lines diagrams, probability correspondence, and accumulation method, in addition to the conventional statistical methods, in studies of quality control. Also, the advent of electronic computors have facilitated the study of many theoretical problems usually encountered in quality control.

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CHINA REPORT

SCIENCE AND TECHNOLOGY

No. 67

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APPLIED SCIENCES

Developments, Future of China's Space Electronics
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DEVELOPMENTS, FUTURE OF CHINA'S SPACE ELECTRONICS

Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese No 2, Jun 80
pp 78-79

[Article by Chen Fangyun [7115 5364 0336], Pan Huajiang [3382 5478 3068] and Wang Yifei [3076 0001 7378]: "The Development and Future Prospects of Space Electronics"]

[Excerpts] (Abstract) This paper summarizes and reviews the radio electronic technology used in the field of space electronics, including tracking and control of artificial satellites, space exploration, observation of the earth by satellites, satellite communication and broadcasting and fixing the position of moving objects by satellites. More prominent space electronics systems of recent years and their accomplishments are cited, and features unique to space electronics are analyzed. This paper also gives a brief introduction to space electronics developments in China and, in conclusion, to the future prospects of space electronics.

V. Standard and Unique Features of Space Electronics in China

It has been 10 years since China launched its first earth satellite, and it would be 15 years if one counted from the year China began its space research (and hence the work on space electronics). In these 15 years, China has established a foundation for space electronics through great coordinated efforts by the various institutes in the nation and, in the process, thousands of space electronics researchers and technicians have been cultivated and a substantial technical base for experimentation and for manufacturing has been built. The eight satellites launched by China carry a variety of electronic equipment and instrumentation, including remote sensing, remote control, signal transmitter and receiver for orbit monitoring, and various other kinds of instruments for space exploration. We have established a fair amount of ground systems for satellite monitoring and control, with most of them being radio electronic systems. The entire sensing and control system is centrally managed by one computer center, in which different data are processed. We are able to control the return of the satellites to earth and to forecast the landing location relatively accurately, which makes China the third nation in the world, next to only the United States and the Soviet Union, to have the know-how for satellite recovery.

Recalling the history and looking into the future of China's development in space electronics, we can tentatively identify the following unique features:

1. We have insisted on the principles of self-reliance and self-sufficiency. Up until now, all electronic instruments used in our space electronics were developed and built by ourselves; not one piece of material or component in this equipment was not made in China. In development work, from system design and scientific research to manufacturing and testing, all problems were solved through our own efforts and through thorough investigation and utilization of foreign data, with our own innovations and improvements in certain cases. As for ground monitoring and control systems, we are also entirely self-sufficient without the benefit of foreign facilities. All these are achievements of which we can be proud. On the other hand, since we have not taken advantage of international cooperation, we have been relatively slow in certain developments and have been falling behind. In the future we should take reasonable advantage of the benefits of international cooperation and selectively introduce advanced technology so that our space electronics will move forward at a faster pace.

2. We have employed the principle of composite usage. Ever since China's first satellite, we have been taking into consideration the multiple usage idea for efficient use of satellite-borne equipment and electric power sources. On our first satellite, the music "East Is Red" and the satellite remote-sensing signals were transmitted down to earth by the same transmitter on a timesharing basis. Both signals can be received by the same communications receiver and theoutput recorded by the same recorder. In developing the ultrashortwave double-frequency Doppler shift orbit monitor system, we once again used the same principle and combined it with the satellite remote-sensing signal without compromising the accuracy of velocity measurements. New satellite tracking systems capable of handling multiple signals for high-precision angular and distance measurements are now in the developmental stage.

3. We must overcome the difficulties in signal transmission and in monitoring and control caused by geographic limitations. From satellite tracking and monitoring points of view, the longitudinal and latitudinal span of China poses certain difficulties. For a satellite in its circular orbit at an altitude of 200 km, observations made of China usually can cover only a small circular arc of 3 to 4 consecutive orbits, and within a given day there would be 7 or 8 consecutive orbits that do not pass over China at all. Similar problems exist for satellites in 1,000-km orbits. As a result, information collected over foreign countries cannot be transmitted back to the Chinese ground-receiving stations in time. This situation is detrimental to the collection of a wide range of weather and oceanographic data. In the meantime, the limited visibility of the satellite orbits also impairs accuracy in orbit determination and makes it difficult to pinpoint the satellite's location when it is not over China. This is particularly true for the several consecutive orbits that do not pass over China. This situation is not favorable for the collection and utilization of data. Clearly we must overcome these geographic difficulties, and it appears that research work on systems similar to the American tracking and data relay satellites are very essential. In the meantime, we should look into preliminary data processing and data storage on the satellite. Once the satellite had acquired data while over foreign countries, excessive unwanted signals could be deleted and essential data extracted and stored until the satellite entered the visibility range of Chinese ground

stations, where the [data] would be transmitted down in a relatively narrow frequency bandwidth. If neither of the above two solutions is achieved, the development of China's utility satellites (at least the low-altitude ones) will suffer considerable limitations. A solution to this problem rests mainly with the efforts of people working in the space electronics field.

Considerable difficulties have been encountered in the course of developing China's space electronics: for instance, an inadequate variety of electronic parts and components, the quality of certain components not up to the standard of space application requirements, low-quality manufacturing techniques and a long lead time, and so on. But on the whole, China's endeavors in space electronics have had considerable strength and sophistication and, with sound organization, it is quite possible that before long China will catch up with advanced world standards in many areas of this field.

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Fabrication of Hollow Superconducting NbTi Composites...... Zhao Xuanlan [6392 6693 5695], Seventh Research Laboratory, Baoji Non-Ferrous Metal Research Institute (78)

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AUTHOR: XU Yuqi [1776 3768 7784]

ORG: None

TITLE: "Analysis of Telephone Pre-loaded Network in Satellite Communication"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 2, Feb 80 pp 6-8

ABSTRACT: In satellite communication, telephone pre-loaded network is one method of improving the signal noise ratio and raising the quality of the circuit. Based upon the property requirements of international satellite organization, the author and colleagues designed and tested a pre-loaded system which raises the high frequency component of the signals before transmission to compress the low frequency component of multi-frequency signals. In this manner, the high frequency segment and signal noise ratio is improved. When the signals reach the destination, signal noise ratio of the various paths tends to be the same. In order to recover the original wave form, generally a network with the opposite characteristic is installed at the output terminal of the demodulator of the reception system to remove the added load. The technical indices, the network analysis, the computation equations, the circuit diagrams, and the experimental data are given.

AUTHOR: None

ORG: Automatic Telegram Transmission Research Group, Shanghai Bureau of Telegraphy

TITLE: "Application of DJS-131 Electronic Computer in Automatic Transmission of Telegrams"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 2, Feb 80 pp 10-12

ABSTRACT: Shanghai Bureau of Telegraphy is responsible for a busy domestic and international telegraphic traffic. For the purpose of changing the backward condition of manual transfer of telegrams, the bureau began to study the new technique of using electronic computer for automatic transfer of telegrams, with the assistance of Shanghai Radio Thirteenth Plant and Fudan University in 1975. Two DJS-131 electronic computers were installed in 1976 and 77 respectively. Intermediate tests have proved that the system is basically functioning with a period of stabilility of several hundreds of hours. The average time for transferring a telegram is about 3 minutes, 1/10 of the time required for manual transfer. The error rate is 0.04 percent, amounting to 1/8 of the rate of manual work. Currently the intermediate tests are being reviewed so that the system may soon be operating officially. The work principle of the automated system, and the hard and soft characteristics of the system are discussed.

AUTHOR: ZHU Yaofang [2612 5069 2455]

ORG: State Operated 822 Plant

TITLE: "Ultra-low Speed Miniature Digital Magnetic Tape Machine"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 2, Feb 80 pp 24-26, 23

ABSTRACT: Digital magnetic recording technology is now extensively applied in China. Under normal conditions, the magnetic recorder serves as an external storage equipment of digital electronic computers or for telemetric recording in space travel. A large quantity of data in such scientific research fields of aerial ore prospecting, oil well surveying, earthquake forecasting, and oceanographic studies must also be processed in modernized computers, however. These data cannot be obtained within a short period of time, and the recording equipment must have a large capacity, long recording time, small volume, light weight, and minimal power consumption. The author and colleagues studied and made for the State's Bureau of Oceanography the SC-2 and the SC-2F magnetic tape machines capable of both writing and reading. The principle of writing, the magnetic writing head and circuit, and the magnetic reading head and circuit are described.

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ORG: None

TITLE: "New Method of Making Electron Gun Electrode--Electric Casting Method"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 2, Feb 80 pp 27-29

ABSTRACT: The so-called electric casting method is to use a suitable metal to make a core mold first before using electroplating method to add a layer of metal in a suitable thickness. Finally, a method must be found to release this layer of electroplated metal from the core mold. Unlike electroplating which is for the purpose of protecting the metal under the plating from oxidiztion and corrosion, the purpose of electric casting is to make the item in accordance with the size and shape of the core mold. The casting layer; therefore, must be thicker than the plating layer. The key to this method is how to remove the core mold. After repeated experimentation, the author and colleagues adopted the rapid heating and rapid cooling technique. Utilizing the different expansion coefficients of the 2 metals, the metal core can be separated from the plated metal of the surface to form the meeded electron gun. Related problems are discussed.

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TITLE: "New Products Introduced"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 2, Feb 80 pp 8; 41,18; 42-43; 43; 44

ABSTRACT: Five new products are introduced: (1) The SYD-201 Computer: A small general purpose computer with an entirely new system design, suitable for scientific calculation, data processing, and real-time control, etc. is now being produced in small batches. (2) Three Base Line Transistor Receiver High Frequency Frequency Scanning Device: The technical properties and the block diagram of the entire receiver are given. (3) XB19 Standard Signal Generator: It is soon to be officially manufactured by the Shanghai Radio 26th Plant. It is all transistorized, weighing 24 kg. It may be used to test 10 cm wave band microwave system signal source. Major properties and work theory are described. (4) PJX-1 Circuit Board for Semiconductors: It has 375 soldering points and 30 leading out

[continuation of DIANZI JISHU No 3 1980 pp 8; 41,18; 42-43; 43; 44]

terminals. The technical data are given. (5) D030 Triple Purpose Meter Testing Instrument: It is designed for testing ordinary triple-purpose meter and various electromagnetic probing head below the 1.5 grade. The instrument, a type of AC DC voltage current generator, is made by Weifang City Institute of Electronics Research.

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TITLE: "Discussion on the Designing Parameters of an Electro-Controlled Gyro-Compass"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 1-19

TEXT OF ENGLISH ABSTRACT: The following questions about an electro-controlled gyro-compass are discussed in this paper. They are the characteristics of the ballistic error, the accumulation of ballistic errors, the error due to the unchanged control torque of the speed corrector when the ship's speed is changing in the maneuvering process and the relationship between the parameters of the compass and the error due to the random disturbances. On this basis the authors have put forward their ideas about how to choose the parameters of an electro-controlled gyro-compass.

AUTHOR: LIU Yanzhu [0491 1693 2691]

ORG: Engineering Mechanics Department

TITLE: "On the Dynamics of an Imperfect Dynamically Tuned Gyroscope"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 21-33

TEXT OF ENGLISH ABSTRACT: Some problems of the dynamics of a dynamically tuned gyroscope under imperfect conditions is discussed in this paper. The influence of some imperfect factors, such as the nonorthogonality and nonintersection of the system of gimbal axis, the mass unbalance of the rotor and gimbal, on the dynamics of the gyroscope is investigated. The disturbing torques associated with the linear and angular vibration of the gyro's foundation are derived. It also gives the theoretical analysis and evaluation of some designs of single-gimbal or double-gimbal tuned gyroscopes with nonintersecting gimbal axis.

AUTHOR: JIN Zhongji [6855 0112 7535]

ORG: Precision Instruments Department

TITLE: "RC Transfer Function Synthesis--A Cascade Synthesis Method with Two-Pole Admittance Functions"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 35-48

TEXT OF ENGLISH ABSTRACT: A method is developed for synthesizing RC high order transfer functions by cascade processes. Complex zeroes can be realized in a RC network by the cascade synthesis method since Dasher and Guillemin developed a more elegant method. Their methods have been widely used in engineering practice, especially in control system design. This paper gives an extension of Guillemin's method; here two-pole admittance functions are used to realize three zeroes at once (per cycle), and thus the complex zeroes in the right half plane can also be realized. A realization theorem for two-pole admittance functions is derived in which the realizable region of the numerator coefficients of the transfer admittance is determined. It is useful when a RC series-parallel network is synthesized. Using this method, relatively simple circuit structure and reasonable circuit parameters can usually be obtained in the resulting network.

AUTHOR: YUAN Tianxin [5913 1131 9515]
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TITLE: "Optimal Design of Marine (Long-Time Operating) Semi-Analytic Inertial Navigation System"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 49-63

TEXT OF ENGLISH ABSTRACT: In this paper a simplified method of optimal design applied to semi-analytic inertial navigation systems of marine (long-time operating) is discussed. When the simulation is carried out on the digital computer DJS-6, in order to evaluate the performance of the simplified optimal design approach, the square root algorithm is used for optimal recursive filter (Kalman filter) so as to reduce the effect of computational error on the filter, and a set of non-linear equations in the case of linear motion with constant velocity is employed for the equations of the inertial navigation system. Thus, the above-mentioned method is close to the actual case. The detailed derivation of the principles of inertial navigation and optimal recursive filter have not been made, and some conclusions concerning modern control theory are used directly in this paper.

AUTHOR: ZHAO Jiaju [6392 1367 7467]

ORG: Applied Physics Department

TITLE: "Coherence Properties of a Pulsed Frequency-Doubled Nd:YAG Laser"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 65-72

TEXT OF ENGLISH ABSTRACT: The coherence properties of a Q-switched frequency-doubled Nd:YAG laser have been investigated by a Michelson interferometer and photography. In this experimental study, coherence degree $|\gamma_{(\tau)}|$ was measured as a function of path length difference and of the ratio of input energy to threshold input energy. The coherence length measured was 40 mm at a ratio of input energy to threshold energy of 3.2. Spatial coherence of the beam was deduced from the fringes formed by a Michelson interferometer in which the laser beam interferes with itself after being rotated 180°. The experimental results are physical interpreted.

AUTHOR: SHI Songjiao [2457 7317 2786]

ORG: Electrical Engineering and Computer Science Department

TITLE: "A Synthesis Approach of Typical Automatic Control Systems by Using Only the Bode Gain Plot"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 73-82

TEXT OF ENGLISH ABSTRACT: According to the corresponding relationship between the Bode gain plot and the Bode phase plot of a minimum phase system, the performance of a system can be uniquely determined. The relationship between the Bode gain plot and the system's performance has been carried out with the aid of a digital computer, and a set of durves has been obtained. Thus, we present an approach for the synthesis and design of typical control systems by using only the Bode gain plot, and it is not necessary to use the Bode phase plot. This approach greatly simplifies the design procedures and reduces a large amount of effort in designing a control system.

AUTHOR: SHAO Shiming [6730 0013 2494]
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ORG: All of the Ship Hydrodynamics Department

TITLE: "The Effects of Bow Spray Strips on Resistance and Seakeeping Qualities of High-Speed Displacement Hull"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 83-91

TEXT OF ENGLISH ABSTRACT: Fitting bow spray strips on the hull of high speed displacement vessels is a simple and effective method of restricting the bow wave and spray. However, the reduction in resistance can be achieved only in the case of Froude Number $Frn > 1.0$.

In order to extend the speed range of reducing the resistance by fitting bow spray strips, an experimental investigation has been carried out in the Ship Hydrodynamics Laboratory of Shanghai Jiaotong University. The model test results show that not only are the bow wave and spray considerably improved by fitting a favorable combination of bow spray strips and stern flap, but the following achievements are also obtained:
(1) The speed range of reducing resistance is extended from $Fr_n > 1.0$ to $Fr_n > 0.5$;

[Continuation of SHANGHAI JIAOTONG DAXUE XUEBAO No 3, May 80 pp 83-91]

(2) An amount of 6.5 percent reduction in total resistance or 14 percent reduction in residuary resistance is obtained within the whole experimental range. It corresponds to 1.5 knots increase of design speed for the actual ship at the same effective horsepower.
(3) The seakeeping qualities are also improved.

AUTHOR: PU Baorong [3184 0202 2837]
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TITLE: "Analytical Solutions of the Temperature Field of High Pressure Vessels During Annealing by Electrical Infrared Radiation Heaters"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 93-106

TEXT OF ENGLISH ABSTRACT: After welding of high pressure vessels, annealing is necessary to remove the residual stress which is induced during the welding. For large high pressure vessels, the most economical and effective method is to adopt electrical infrared radiation heaters both for heating and annealing along the welding seams. But, for the sake of the right uses of this method of annealing, the temperature field near the welding seam during the heating and annealing processes must be thoroughly studied.

The heating and annealing processes have been analyzed, and a physical-mathematical model for the research of the temperature field is proposed. Partial differential equations of 2-D of steady and transient states in complex boundary conditions are derived. After making two reasonable assumptions and by applying some skillful methods, we succeeded in transforming a 2-D partial differential equation into two

[Continuation of SHANGHAI JIAOTONG DAXUE XUEBAO No 3, May 80 pp 93-106]

1-D equations, and then derived the analytical solutions of the above-mentioned equations by means of mathematical analysis and Laplace-transformation. The solutions thus obtained almost coincide exactly with the results obtained from digital computations by the computers.

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TITLE: "JD (Jiaotong University)-1 Foundry Core Binder of Complexed-Crosslinked Type"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 107-120

TEXT OF ENGLISH ABSTRACT: The JD-1 foundry core binder is developed on the basis of polyacrylic acid with a series of modifications, such as terepolymerization, crosslinking, neutralization to ammonium salt and formation of polyionic complex with polyarylamide.

The JD-1 foundry core binder has many advantages, viz:
(1) It is incombustible, inexplosive and not corrosive.
(2) It is poisonless and odorless during core-making, drying and casting. It causes no environmental pollution.
(3) The cores made from the JD-1 foundry binder have high dry strength, low gas evolution, good deformability, excellent collapsibility (knock-out property), satisfactory dimensional accuracy and surface quality.

[Continuation of SHANGHAI JIAOTONG DAXUE XUEBAO No 3, May 80 pp 107-120]

The JD-1 foundry core binder can successfully take the place of the oil binder (tung or linseed oil). Core sands prepared from the JD-1 foundry binder are suitable for producing non-ferrous castings with hollows or water jackets of intricate shapes.

The mechanism of hardening and basic properties of the JD-1 foundry core binder have also been investigated.

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TITLE: "Superplasticity of Ball Bearing Steel"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 121-133

TEXT OF ENGLISH ABSTRACT: The paper presents the results of a comprehensive study on achieving superplasticity with commercial ball bearing steel. A series of tests have been made for the influence of heat treatment technology on grain size and the influence of deformation temperature, strain rates and grain size on the elongations during the superplastic tensile test.

Results of these tests showed that specimens twice quenched in oil possess the greatest practical value and their elongations are more than 500 percent. The deformation temperature and strain rates of superplastic alloys alternately influence each other within the fixed range. Thus, ball bearing steel possesses superplasticity with larger elongations within 680-730°C temperature and $1.2 \times 10^{-2} \sim 2 \times 10^{-3}$ min^{-1} strain rates in which its least elongation is more than 400 percent. All these parameters will create favorable conditions for superplastic forming of ball bearing steel.

[Continuation of SHANGHAI JIAOTONG DAXUE XUEBAO No 3, May 80 pp 121-133]

Ball bearing steel possesses the largest value of strain rate sensitivity index $m = 0.4$ at the temperature 680°C, $\dot{\varepsilon} = 1.2 \times 10^{-2}$ min^{-1} strain rate.

AUTHOR: JIN Yongjie [6855 3057 2638]
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ORG: Both of the Engineering Mechanics Department

TITLE: "Limit Load of Opposed Extrusion-Piercing in Plane Strain"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 135-146

TEXT OF ENGLISH ABSTRACT: This paper is prepared for solving the problem of opposed extrusion-piercing in the condition of plane strain. The material is assumed to be a rigid-perfect plastic material. The working conditions of extrusion and piercing assume that the punch surface and the wall of the container are smooth and frictionless. The authors analyzed and calculated this problem under the condition that the reduced rates of the above and below holes are both two-thirds. This calculating method also can be applied in the other condition in which the reduced rate of the above hole is equal to that of the below one. On calculating the lower bound, we utilize the discontinuous line of stress. We have found many statically admissible stress fields, and have deduced a calculating formula with the geometric relation of Prager's stress plane. Furthermore, we utilize the discontinuous line of velocity on calculating the upper bound. These methods are simple and easy. The values of upper and lower bound which the authors obtained are compared to each other.

AUTHOR: JIANG Sijie [5592 1835 2638]

ORG: Power Mechanics Department

TITLE: "The Synopsis of a Computer Program for the Analysis of Composite Structure"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 147-155

TEXT OF ENGLISH ABSTRACT: The computer program RCS described in this article is a general program for the solution of spatial thin-shell-and-bar composite structure, using the method of multiple substructures. The present article describes the principle of substructures and several new techniques used in the program.

AUTHOR: YAN Zhiyuan [0917 2535 3220]

ORG: Industrial Engineering Department

TITLE: "Queuing Theory and Its Application"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, May 80 pp 157-167

TEXT OF ENGLISH ABSTRACT: This article is intended to provide the basic concept and method of queuing theory for the reader. The author hopes that engineers, managers and others responsible for engineering design, industrial production and management may find that the queuing theory is a useful guide to the problems and methods treated, with a view to practical applications. This article explains what the queuing theory is and interprets its commonly-used terms in popular language. The queuing theory can be applied to various fields, such as industry, agriculture, transportation, national defense and urban service systems, etc.

This article contains several case studies and makes some heuristic discussions on its results.

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TITLE: "Studies on DNA-Dependent RNA Polymerases. III. Comparative Study between Two RNA Polymerase B from Liver Cells of Normal 615 Mouse and Leukemic 615 Mouse"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 3, Sep 80 pp 201-207

TEXT OF ENGLISH ABSTRACT: We have studied RNA polymerase B of normal cells and leukemic cells from 615 mouse. It is found that two forms of RNA polymerase B exist in liver cells, one of them is of the engaged form while the other is of free form. In comparison of RNA polymerase B in the leukemic mouse (L615) with that of the normal mouse (615), we have found there are two protein bands associated closely with L615 enzyme B, but not with 615 enzyme B. For these two forms of enzymes the optimum ionic strength of ammonium is about 90 mM; of the stimulating activities for the two enzymes, manganese ion is stronger than magnesium ion. The two kinds of RNA polymerase B are very sensitive to the inhibition of α-amanitine, but the L615 mouse RNA polymerase B is more sensitive. The denatured DNA is a suitable template for transcription of the two RNA polymerase B's.

AUTHOR: WU Lifu [0702 4539 3940]

ORG: Department of Biology, Guiyang Medical College, Guizhou

TITLE: "A Case Report of 9p+ and XXq- Syndrome"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 3, Sep 80 pp 268-270

TEXT OF ENGLISH ABSTRACT: Chromosome abnormalities were studied in a girl with multiple congenital anomalies. Trisomy of the short arm of chromosome 9 (9p+) and distal deletion of the long arm of X-chromosome were found with G banding and C banding techniques. The clinical features included psychomotor and growth retardation, short stature, moderate microcephaly, hypertelorism and enophthamos, prominent nose with inverted nostrils, short upper lip, low-set ears, low posterior hairline, anomalies of phalanges and vertebrae, widely-spaced hypoplastic nipples, undeveloped breasts, delayed onset of menarche and dermatoglyphic abnormalities.

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TITLE: "The Plasmid Transformation in Kanamycin-Producing Strain Kp 958-4 in Relation to Producing Antibiotics"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 3, Sep 80 pp 276-280

TEXT OF ENGLISH ABSTRACT: The transformation principle Ko-p 77 which possessed the ability of producing kanamycin and forming spores was obtained when the plasmid-negative strain Ko 42-7 used as recipient was transformed with the kanamycin-producing strain Kp 958-4 as donor. The antibiotic spectra of Ko-p 77 and Kp 958-4 were similar to the Rf-values in the six solvent systems used. These denoted that the plasmid DNAs derived from the strains of S. kanamyceticus could carry out the transformation between the strains themselves.

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TITLE: "Studies on the Chromosomes of Tumors in Common Laboratory Animals. II. Karyotypic Analysis of the Walker 256 Carcinoma of the Rat"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 3, Sep 80 pp 281-286

TEXT OF ENGLISH ABSTRACT: In the present paper the karyotype of the Walker 256 carcinoma of the rat is analyzed with several banding techniques. The results show that the Walker 256 carcinoma is hypo-triploid with a modal number of 57-58 (18.0-23.5 percent) and eight marker chromosomes. By Ag-AS procedure, silver stained NORs (Ag-NORs) are visualized as black spherical bodies on three chromosomes in the karyotype of the Walker 256 carcinoma.

9717
CSO: 4009

AUTHORS: LIU Biao [0491 2871], BU Xianchao [0592 7341 6389]

ORG: Sichuan Asbestos Mine

TITLE: "Making of Pits by Deep Hone Continuous Blasting"

SOURCE: Beijing FEIJINSHU KUANG [NONMETALLIC ORES] in Chinese No 1, Feb 80 pp 1-7

ABSTRACT: The section-by-section deep hole continuous blasting method is an easy, safe and effective way of blasting a pit. The method uses a working hole, an empty hole and surrounding holes, each of which except the empty hole contains explosive in several sections separated by filler, with each section separately detonated. The empty hole parallel to the working hole provides room for the initial blast to force away the rock in between; the blasts in the surrounding holes can then move the rock into the space left by the working hole and empty hole. The quantity of explosive in each hole must be carefully chosen so as to avoid jamming subsequent holes and preventing explosion. Methods of choosing blast hole size and spacing in terms of the rock category are discussed and the principle of a spiral arrangement of successive holes is described. The principles for determining the quantity of explosive used, thickness of packing between sections so as to prevent jamming, and size of sections are described.

AUTHOR: ZHANG Jinfa [1728 2516 4099]

ORG: Yingcheng Gypsum Mine, Hubei

TITLE: "Five-Man Three-Cycle Rapid Tunneling"

SOURCE: Beijing FEIJINSHU KUANG [NONMETALLIC ORES] in Chinese No 1, Feb 80 pp 29-31

ABSTRACT: In order to organize rapid tunneling, a coordinated system was worked out in which each of five groups has a specific set of activities of carefully planned duration which dovetail with those of the other four groups in a 3-hour cycle. Thus two of five groups are engaged in drilling while three groups are engaged in putting up supports and subsequently in laying track and packaging explosive. While two groups are inserting the explosive and detonating it, three groups are cleaning the tools; while two groups are doing ventilation work, three groups are engaged in preparing the workface; and finally, all five groups are busy with rock loading. Calculations by which the drilling parameters are determined are illustrated. The average advance per cycle is 1.3 meters, the average blasting efficiency 95 percent, the average advance per shift 3.9 meters, the average explosive used is 10.3 kg/meter, and the average monthly advance 363 meters (3 shifts a day).

AUTHOR: SONG Yubao [1345 3768 0202]

ORG: Jinzhou Asbestos Mine

TITLE: "Improvement of a Hydraulic Rock Drill Forging Machine"

SOURCE: Beijing FEIJINSHU KUANG [NONMETALLIC ORES] in Chinese No 1, Feb 80 p 39

ABSTRACT: Improvements made on a hydraulic rock drill forging machine were as follows. A different electric motor more suited to the specific pace of production was fitted, saving 52 kwh a day. Previously, hot cutting of the tool tip had been done on a pneumatic machine, but this operation was transferred to the hydraulic device, and a special cutting tool designed for the purpose. Steel hydraulic pipe was replaced by rubber-coated woven wire hydraulic hose, a hole punch shape was improved and a support frame added. The one remaining use of the pneumatic forging machine, that of making bolts for a rock crusher, was also transferred to the hydraulic forging machine.

AUTHOR: None

ORG: Technical Department, Jinzhou Asbestos Mine

TITLE: "Introduction to Two Simple Automatic Ore Release Gates"

SOURCE: Beijing FEIJINSHU KUANG [NONMETALLIC ORES] in Chinese No 1, Feb 80 p 44

ABSTRACT: The automatic gates for releasing materials from hoppers were developed. The first was a fan-type gate closing the tailings hopper at the concentration plant. This gate was worked by a cable attached to the ground; when a truck backed into it, it pulled open the hopper gate. The other device was for loading large pieces of spoil rock (300 mm) into trucks. It was a horizontal sliding gate under the hopper and it was operated by a board onto which the truck backed, pulling a cable which slid the gate open. When the truck drove off the board, a counterweight pulled the gate closed again.

AUTHOR: ZHOU Zhike [0719 1807 4430]

ORG: Xinzheng Asbestos Mine, Chaoyang, Liaoning Province

TITLE: "The NG500 Asbestos Fiber Concentrator"

SOURCE: Beijing FEIJINSHU KUANG [NONMETALLIC ORES] in Chinese No 2, May 80 p 1-2

ABSTRACT: The NG500 asbestos fiber concentrator, based on foreign equipment, uses a large rotating drum against which the fibers are drawn. The asbestos fiber recovery rate is 90 percent, compared with 60 percent for foreign machines. The sand content is 30 percent, compared with 60 percent for foreign machines. A diagram of the machine is presented.

AUTHOR: LI Jierong [2621 4105 2837]

ORG: Research Institute, Nanbi Graphite Mine

TITLE: "Improve Graphite Flotation Processes, Improve the Classification Recovery Rate"

SOURCE: Beijing FEIJINSHU KUANG [NONMETALLIC ORES] in Chinese No 2, May 80 pp 24-32

ABSTRACT: The development of processes used in the mine over a 30-year period is detailed: a process with two grinding steps and 6 concentration steps; a process with 5 grindings and 11 concentrations; a process of stepped-up concentration of the reground graphite; a process with thickening and regrinding of middlings; a process with successive middling recovery; and a simplified process with several of the steps combined. Flow charts of all the processes are included. A discussion of the principles on which selection of flowcharts for flake graphite should be based is given.

8480
CSO: 4009

AUTHOR: WANG Mingzhong [3769 2494 1813]

ORG: None

TITLE: "Tidbits of Canadian Satellite Communication System

SOURCE: Shanghai DIANKIN KUAIBAO [TELECOMMUNICATIONS BULLETIN] in Chinese Nos 1-2, 1980, pp 1-10

ABSTRACT: This article begins with a brief introduction to the history and development of microcomputers abroad and classifications of microcomputers according to the word length, power level and structure. It goes on to describe applications of microcomputers in the telephone exchange with specific examples including UNIMAT series small exchange, ITT Model 1220 digital exchange with Delta 16 microprocessor, etc.; applications to telephones with specific examples including Transaction digital telephone developed by the Bell Laboratory; and applications to real-time digital signal processing. Some of the problems encountered in the process of applying microcomputers to the communication system and the demands on microcomputers are also briefly discussed. Included are several tables and diagrams describing the characteristics of some microcomputers and illustrating the method of application of these microcomputers. A bibliography consisting of 11 papers is also included.

AUTHOR: WU Zhong [0702 1813]

ORG: None

TITLE: "Some Applications of Microcomputer in Communications Abroad"

SOURCE: Shanghai DIANKIN KUAIBAO [TELECOMMUNICATIONS BULLETIN] in Chinese No 3, 1980 pp 27-42

ABSTRACT: This is a summary of a report prepared by the author after his visit to and inspection of Canada's satellite communication system. It briefly describes the organization of Canada's domestic satellite communications and an outline of its main ground station located at Allan Park in the suburbs of Toronto. It also describes the general conditions of Canada's international satellite communications, satellite communications equipment, and research and construction of this equipment. The future trend of Canada's satellite communications together with the impressions of the author about Canada's satellite communication system which China may take as an example or warning in the development of her own satellite communication system are also included. The authors impressions: 1) Communications enterprise must have well-defined division of labor as well as unified technological coordination. 2) Technological development must have a complete and well-defined plan. 3) New technology must be utilized as much as possible, but one should never lose sight of the economical effect. 4) Many Canadian enterprises are small in scale yet highly experienced and highly efficient.

AUTHOR: QIU Yuanheng [6726 3293 0077]

ORG: None

TITLE: "Corrugated Conical Feed

SOURCE: Shanghai DIANXIN KUAIBAO [TELECOMMUNICATIONS BULLETIN] in Chinese No 4, 1980 pp 1-12

ABSTRACT: Chromatic dispersion characteristics of space harmonic wave of the Floquet propagation mode of a periodically applied waveguide was analyzed theoretically. Applying Floquet principle, the fields in the two regions of a corrugated waveguide were found by the mode matching method using the continuity condition at $r=a$ and other boundary conditions. Characteristic equations describing the relationship between propagation characteristics and tooth thickness and groove pitch were obtained. It was found that the HE_{11} propagation mode in a corrugated circular waveguide possessed a useful bandwidth of 2:1. Under an equilibrium mixed state, the HE_{11} mode was found to be axi-symmetric, circularly polarized with maximum in the axial direction and zero at a wall of the waveguide. Broadbanding by means of ring-loading of a corrugated waveguide was analyzed using groove admittance in the frequency range in which the groove admittance was capacitive admittance. The useful frequency bandwidth could be broadened to 3:1. The transverse field characteristics of a corrugated conical horn having $E_\phi=H_\phi=0$ on the boundary were also analyzed. The transverse component of field was found to vanish at the boundary where $\theta=\theta_0$. Finally, Huygen's principle was used to derive the plane field at the opening of the horn. It was found to be the far field radiation of a spherical

[continuation of DIANKIN KUAIBAO No 4, 1980 pp 1-12]

wave which was independent of the azimuthal angle ϕ. The directional diagram drawn on all planes passing through the axis were identical in shape, or the field was axi-symmetric. The field was also characterized by small side lobes and small intersecting polarization.

9113
CSO: 4009

AUTHOR: CHEN Jiansheng [7115 1696 3932]

ORG: None

TITLE: "Eliminating One Case of Malfunction in DT204 Remote Supply Frame"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 1, 80 pp 4-5

ABSTRACT: Inside the coaxial cable, there are 4 high frequency core groups capable of opening 12 lines of carrier waves. In the manned segment, an unmanned audio amplifer is needed every 12 km. The power of these unmanned audio amplifiers is supplied by the DT 204 type 1800-line carrier wave distant supply frame in which there is a 12-line supply disk, with 2 transmission disks in each supply line; when one is in operation the other is in a state of "cold readiness." Once upon a time, when the spare disk was in use, the main disk was unable to enter the state of "cold readiness." Each of the 2 disks was in good working condition independently, however. Following analysis, it was discovered that the base-collector of the BG_1 tube of the main disk was blown to result in a short circuit. When the tube was replaced, the trouble was eliminated. The process of analysis and the reason for the described trouble to occur when the BG_1 tube of the main disk is blown are described.

AUTHOR: LI Xinchang [2621 2450 7022]

ORG: None

TITLE: "One Case of Looking for 'Two-Line Terminal' Noise"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 1, 80 p 5

ABSTRACT: When a certain 12 Z-D-10 machine of the station with which the author was affiliated was being repaired, the "2-line terminal" noise of that machine was discovered to be high. The noise of the poorer line averaged -5.4 Np, and 50 Hz low frequency sound may be heard. For the purpose of locating the source of this problem, the machine's power supply, the 220 v rectifier was tested and its noise level was found to be normal and when a battery was used to supply the machine, the "2-line terminal" noise was not obviously improved. When other machines were shut off one by one at the station, the trouble remained the same. After these and other methods were used to pin point the source of the trouble, it was finally discovered that the C_{12} capacitor was broken. The noise was eliminated when C_{12} was replaced. The reason for the occurrence of such a noise level when the C_{12} of the 50 Hz oscillator disk is rendered ineffective is explained.

AUTHOR: ZHUO Liangjin [0587 5328 6651]

ORG: None

TITLE: "A Minor Improvement for the Chasis Circuit of a Double-headed Telegraph Transmitter"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 1, 80 pp 7-8

ABSTRACT: Various types of problems can occur if the 64-4 B double-headed telegraph transmitter is not operated properly or if it is not properly adjusted. If these troubles occur when the line is not busy, the current may become too great and coils may be burned. The author and colleagues made a small improvement to the circuit of the chasis to allow the components to be shut off automatically when the head is not in operation in order to maintain the 110 v power source of the circuit automatically. A circuit diagram is given to help explain the cause of the troubles and the reason for the minor improvement to be effective.

AUTHOR: SONG Yude [1345 2456 1779]

ORG: None

TITLE: "Long Distance Automatic Telephone"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in China No 1, 80 pp 22-25

ABSTRACT: At present, the manual method is mainly used for connecting long distance telephone in China. That is to say when two exchange stations are manually connected or if the long distance telephone companies of 2 cities are both equipped with automatic exchange stations, then, those customers who are authorized to use long distance telephone may dial the destination directly without first dialing "113" to register the intent of making a long distance call. For example, between Beijing and Hangzhou, the authorized customer just dial "0" to indicate it is long distance, then "611", the exchange number for Hangzhou, then 21601, if the destination is West Lake Hotel. When the line is not loaded, the connection requires only 10 seconds or so from Beijing. This paper describes briefly how this type of long distance telephone calls can be automatically connected. In one section of the paper, automatic switching of long distance phone calls and manual switching are compared.

AUTHOR: XU Kangsheng [1776 1660 3932]

ORG: None

TITLE: "Model Change Improvements of ZM202 Machine"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 2,80 pp 10-11

ABSTRACT: Since the ZM 202 type 3-line carrier wave telephone terminal was first put in production, it has been changed several times. The characteristics of the changes made in various models are explained in the paper for the convenience of maintenance persons. In the original model I, the regulating amplifier is changed manually to compensate for the line attenuation changes; the horizontal and diagonal control components are both capacitance voltage divider with no trigger. When model II was introduced, a thermoelectric automatic horizontal adjusting device was adopted to replace the manual one, and a 2.7 kHz low pass filter and a bell current generating device were added. In model III, a starter was added to the bell current generator to save power and to prevent the bell from ringing by mistake. An earthquake resistant cushion was added to the electron tube of the amplifier to reduce "seismic noise." Minor changes, such as using a diode amplitude modulator in the place of the copper oxide one, etc. are not specially mentioned.

AUTHOR: JI Hai [4764 3189]

ORG: None

TITLE: "The Ocean Floor Cable System of the Greatest Capacity"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 2, 80 p 11

ABSTRACT: This paper gives a brief history of ocean floor cables, starting with the earliest telegraph cable in the English Channel laid in 1850. By 1973, 140 ocean cables were in operation in the world. Today, the one with the greatest capacity is the cable system of NG 45 megahertz manufactured by the British Standard Telephone Cable Company. It was completed in 1977 to serve Rome, Spain, and various outlining islands of the region.

AUTHOR: JIANG Shiqiang [5592 1102 1730]
HUA Chunguang [5363 4783 0342]

ORG: None

TITLE: "Intermediate Frequency Electronic Switch Made by the Authors Themselves"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 2, 80 pp 14-15

ABSTRACT: When a television monitoring machine is used to check the quality of television programs, the intermediate frequency modulation signals are generally sent to the demodulation disk by cable before being sent to the monitoring machine. In actual practice, one monitoring machine is used to inspect one direction (for example, in the direction of Beijing). If at a given moment, there is a need for inspecting the wave quality of a station further down in the direction of transmission, the cable must be removed from the main wave path and plugged into the spare. If interference occurs in the meantime, it will not be detected on the monitoring screen. Furthermore, when the cable is regularly pulled and plugged, troubles can easily occur. In order to resolve this operative problem, the authors made an intermediate frequency electronic switch, which controls and connects the monitoring machine to a different channel at any time. The work theory and the circuit of the switch is described.

AUTHOR: XU Manzhen [1776 2581 3791]

ORG: None

TITLE: "Trends of Development of Batteries"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 2, Feb 80 pp 40-41

ABSTRACT: With the great leap in science and technology after the 1950's, people want betteries to be light weight, small, supplying more power, and longer useful life to cause many new types of batteries to be created. This paper describes the following types: (1) Dry lead batteries; (2) Lead calcium batteries ; (3) colloidal electrolyte lead batteries; (4) Hydrogen elimination batteries; (5) Bell System Cylindrical batteries. The fourth and the fifth types are discussed more in detail in the paper.

AUTHOR: None

ORG: Shanghai Huxin Telecommunication Instrument Plant

TITLE: "Products Introduced: Telephone Communication Safety Wire Dividing Equipment"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 2, Feb 80 p 47

ABSTRACT: The major equipment of telephone communication is the switching machine of the telephone bureau. In order that the switching machines may operate normally, there must be some auxiliary instruments, such as the power supply equipment for the switching machines and the telephone sets of the users, the testing instruments for maintenance and repair, and the connecting wires for the switching machines and the user's sets, as well as the safety wire dividing equipment to protect the safety of the switching machines and the personal safety of the users. The Shanghai Huxin Telecommunication Instrument Plant specializes in producing the safety wire dividing equipment for telephone communication. It has the most complete line of such products in the entire country. The products may be ordered through related ordering conference and delivery is fast. Six types of products are described in two separate sections of circuit breaking equipment and safety wire dividing equipment.

AUTHOR: YANG Renfa [2799 0088 4099]

ORG: None

TITLE: "Improvement to the Bell Current Circuit of the HJ905 Switchboard"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 3, 80 p 4

ABSTRACT: The users complained and the plant's test indicated that the bell current tube 2Z730G of the audio current circuit of the automatic telephone small switchboard HJ905 can be broken easily. Following analysis, the author believe that the reason for the triode to be easily broken is mainly an insufficiency of the reverse blown voltage BV_{CEO}. The BV_{CEO} of 2Z730G = 60 V although the handbook says it should be 90 V. To eliminate the trouble, the author suggests that the 4 diodes $D_1 - D_4$ should be soldered in reverse; the 4 resistors $R_5 - R_8$ should be changed to cause the resistance to be 68 Ω; the connecting line on the original printed circuit board should be altered according to the manner depicted on a graph; the soldering line of terminal 12 and that of terminal 15 in the rear of the printed circuit board of the bell current should be intered changed in order to eliminate the problem.

AUTHOR: WANG Qunshan [3076 5028 1472]

ORG: None

TITLE: "Improvement to the Arrangement Sequence of Channels in Microwave Machine Room"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 3, 80 pp 8-9

ABSTRACT: At present, in the microwave machine room, the microwave machines are arranged I, III, V channels and II, IV, VI channels. For the purpose of resolving the problem of relatively high series noise in some circuit segment passeses, some in-plant testing work of the 960 line I type machine high frequency frame was performed by Telecommunications 506 Plant. The test revealed that under the wave channel arrangement described above, due to filter reflection action, relatively large time delay is introduced into some wave passes to affect the series noise index of these passes. Based upon this finding, suggestions were made to improve the arrangement sequence. For the purpose of clarifying the original problem, the information receiving branch is used as an example to explain the time delay condition of the various wave passes. The condition of interference after the wave pass arrangement sequence is changed is also analyzed.

AUTHOR: WANG Guolan [3769 0948 5663]

ORG: None

TITLE: "Open 12-line Carrier Wave Telephone on a Microwave Repeater"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 3, 80 p 11

ABSTRACT: In order to meet the communication needs of tourism, our province [The author neglects to mention which province] experimented with opening 12-line carrier wave telephone on the 170-174 microwave repeater. The results of the experiment indicate that within a given communication distance, to open a 12-line carrier wave telephone using microwave repeater is possible. Problems of the repeater and problems of the junction between microwave and carrier wave equipment are resolved during the experiment. These problems and solutions are discussed.

AUTHOR: LI Guangya [2621 1639 0068]

ORG: None

TITLE: "Looking for A Trouble With the Waveguide Frequency Reception Control Disk"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 3, 80 p 13

ABSTRACT: Our bureau's [The author neglects to say what bureau] certain ZL3 waveguide frequency modulation system works normally when the modulator key is in "automatic" position and the receiving control key is in "manual heating" position, but if the control key is in either "survey" or "automatic" position, the indicator will suddenly sound an alarm and frequency will drop. When the "automatic regulator" potentiometer R_6 of the control disk is adjusted, the waveguide frequency indicator shows no effect. After a series of tests, it was discovered that the BG_{16} reverse resistance was only 4.5 kiloohm. When the BG_{16} was replaced, the waveguide frequency controlling device operated normally again. The process of testing and searching for the cause of the trouble is described.

AUTHOR: LI Xinchang [2621 2450 7022]

ORG: None

TITLE: "Unified Control of Carrier Wave Room Carrier Frequency"

SOURCE: Beiing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 3, 80 p 14

ABSTRACT: In the carrier supply system of the currently available carrier wave machines, the main oscillator controlled resonance wave generator is mostly adopted to obtain the various needed carrier frequencies. When a problem occurs in the main oscillator, the carrier frequencies of both terminals will not be synchronous and the quality of communication will be affected or communication will be cut off altogether. For the purpose of improving the stability of carrier frequencies and simplifying carrier frequency synchronization, a 300 ZDL 300-line carrier wave machine main oscillator was used for all 3 carrier wave machines of a certain station to control the resonance wave generators of all 3 machines to 4 KHz sunchronous signals. The frequency stability is 3×10^{-7}/month. The procedure for adopting this improvement is described.

AUTHOR: SONG Yude [1345 2456 1779]

ORG: None

TITLE: "Municipal Local Telephone Coordinated Equipment for Long Distance Automatic Telephone"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 3, 80 pp 30-32

ABSTRACT: In Beijing, there are more than 20 telephone bureaus, and only a portion of these can open for long distance because the long distance bureau must install automatic switching equipment and the local bureau must also install long distance coordinated equipment in order to enable that local bureau to open long distance service. This paper explains the reason for the required long distance equipment in the local bureau. The procedure for an authorised user to make a long distance telephone call after his local bureau [station] has installed the appropriate equipment is described.

AUTHOR: CHEN Peizhen [7115 1173 3791]

ORG: Telecommunications 520 Plant

TITLE: "Brief Introduction of the Improved HJ905 Switchboard Machine"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 4, 80 pp 6-7

ABSTRACT: The HJ905 automatic telephone switchboard series are produced by the Telecommunications 520 Plant for internal communication of factories, government organizations, schools, etc. The series come in the 4 types of 200, 400, 600, and 800 switches and relays are provided to connect with municipal telephone bureaus and other small switchboards. The machines are of good quality and are easily maintained, but the 200-switch model has the shortcoming of not capable of being enlarged. If an organization has the need for expanding its switchboard it must order a larger model to replace it. This paper describes an improved design to allow the possibility of the new 200-switch model to double its capacity by adding new components instead of replacing it altogether.

AUTHOR: LI Xinchang [2621 2450 7022]

ORG: None

TITLE: "Small Improvement to the Safety Device"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 4, 80 p 13

ABSTRACT: If the fuse of the safety box of an open-wire carrier communication system is broken by lightning the communication system will be cut off. The author tried at a certain station to experiment with parallel connection of one capacitor each on both sides of the fuse. In that manner, when the thunder and lightening melt the fuse the carrier signals can still pass through the capacitors but the signals will be so obviously weakened to alert the maintenance persons. In the past 3 years since the improvement, the fuse at that station has been blown 8 times while the line has been kept operating throughout the period. An editor's note is attached inviting suggestions from readers concerning this experience.

AUTHOR: WU Xigen [0702 6932 2704]

ORG: None

TITLE: "One Case of Telegraphic Distortion Caused by the ZM202 Carrier Machine"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 4, 80 p 14

ABSTRACT: The end offices of both terminals of a telegraphic transmission line from our bureau [unspecified by the author] to a certain area complained about a serious condition of word distortion. At that time, the lines of the ZM202 carrier machine were undergoing major repairs; therefore, it was taken for granted that the distortion was caused by the repair work and nothing more was done. After the repair work was complete, the condition of distortion remained more serious than normal, but after the line was connected to a different carrier machine, the distortion phenomenon disappeared. Based upon these factors and the fact that unstable transmission current, noise in the circuit, and asynchronous carrier frequency may have caused the distortion, the machine was taken out of operation for testing. After exhaustive testing, it was discovered that for some of the ZM202 machines having no 2.7 kHz low frequency filter, opening a telegraphic transmission line would not be suitable.

AUTHOR: ZHU Fuxiang [2612 4395 4382]

ORG: None

TITLE: "Power Generator Charge Regulator"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 4,80 pp 17-19

ABSTRACT: China's oil fueled generators are mostly equipped with electrical starters. For the purpose of timely charging the starter battery and lightening the plant, etc. they are also equipped with charge generator and charge regulator, etc. Using the FT81-18/12AN/1 regulator as the example, this paper explains the work theory of a charge regulator and the method of installing it. The paper is an edited version of the original manuscript submitted by the author.

AUTHOR: WANG Yuqing [3769 5148 1987]
LI Xiaofeng [2621 2556 1496]

ORG: None

TITLE: "Four to One Method of Line Arrangement"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 4,80 pp 19-21

ABSTRACT: At present, the city telephone lines in China have 4 common methods of arrangement. One method is to connect lines directly to the cable; the second is doubling the connected lines; the third is alternately connecting lines; the fourth is using supplement and auxiliary lines. All four methods have merits and shortcomings. The authors suggest in the paper a four to one ratio to calculate bureau lines and auxiliary lines, based upon the current regulation of multiples of five for line division of telephone systems. The method and and its possible effects of increasing the cable utilization rate and guaranteeing the quality of transmission of the lines are explained.

AUTHOR: SONG Xiuhua [1345 4423 5478]
JIN Guirong [6855 2710 2837]
XI Penghua [1153 7720 5478]

ORG: None

TITLE: "Collection of Experiences in Overcoming Word Distortion in Telegraphic Transmission"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 5, 80 pp 1-4

ABSTRACT: At present, some units have complained about word distortion in telegraphic transmission using the double-headed telegraphic transmitter 64-4. For the purpose of resolving these problems, the General Bureau of Telecommunications of Ministry of Post and Telecommunications called a meeting in Changsha in Jan 80 to discuss the experience in operation and maintenance of the 64-4 double-headed telegraphic transmitter. In 3 separate items, this paper reports selectively the experiences reported at the meeting.

AUTHOR: LIAO Haiping [1675 3189 1627]

ORG: None

TITLE: "A Small Improvement to the Double-headed Telegraphic Transmitter"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 5, 80 p 4

ABSTRACT: In the 64-4 telegraphic transmission machine, the position of the word order magnetic disk is regulated by a stopping screw. Due to the fact that when the machine is in operation, the electromagnetic disk and the stopping screw strike one another constantly, they can easily be damaged by wear to affect the word transmission. The author and colleagues removed the stopping screw and installed a "L" shaped iron blade to regulate the position of the disk. Detail of the improvement is explained and depicted with drawings.

AUTHOR: WANG Xuewen [3769 1331 2429]

ORG: None

TITLE: "Improvement to the Transmission Relay"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 5, 80 p 5

ABSTRACT: In the operating process, adhesion at contact points regularly occurs to the singal relay, the transmission relay, and the C relay of the 64-4 double-headed telegraphic transmitter to cause word distortion to increase. In order to resolve this problem, the author and coleagues replaced the relays with the electronic relays produced by the Wire Electrics Plant of Beijing Long Distance Telecommunications Bureau, but after a period of use, the transmission relay stopped working. Careful inspection disclosed the fact that the triode of the transmission relay became heated, and when the tube was allowed to cool off, the system was operative again, but the problem recurred again soon afterwards. After repeated examinations of the system, they used PR401 type relay with 2 groups of contact points (Product of Daning Relay Plant) to replace the original C relay so that one group of contact spring may be used to control the 110v power source of the transmission relay. After this improvement, the trouble has not recurred.

AUTHOR: DAI Fukui [2071 4395 1145]

ORG: None

TITLE: "Analysis and Repair of Cross-talk With the Receiver Off the Hook in the JZB-1 A Switchboard"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 5, 80 pp 8-9

ABSTRACT: When user No 3045 picked up the receiver, he heard the conversation of 2 parties through his receiver. After examination, it was discovered that when the dial was turned 6.5 steps, his line was connected with 2 other lines. In another case, when user No 2185 picked up the receiver and dialed, he was able to hear the conversation of 2 other parties. Examinations disclosed the fact that when his dial was turned 9 steps, contact with a group of selectors was made. Reasons for these troubles are analyzed and explained and repair measures discussed.

AUTHOR: YANG Bin [2799 2430]

ORG: None

TITLE: "Searching for Cause of One Incident of "Vibration" in a Unmanned Audio Amplifier for 1800 Lines"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 5, 80 pp 11-12

ABSTRACT: Station B and Station A are 2 adjacent manned stations of the 1800-line, and in between these 2 manned stations, there are a total of 19 unmanned stations, and of these, 07 station and 15 station are single conduction frequency stations. Recently, an incident of "vibration" occurred between Station A and Station B. Abnormal frequency from B was received by A: the 4287KHz was high and the 308KHz and 8500KHz were extremely low. Alarms of all frequency monitoring points sounded off and very large noises occurred on the lines. The reason for the lines to produce self-excited vibration is analyzed and the process and the method of searching for the reason are reported.

AUTHOR: WANG Beingnan [3769 3521 0589]

ORG: None

TITLE: "Method of Adding The Characteristic of User Number Continuous Selection to HJ905"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 6,80 pp 3-6

ABSTRACT: At present, the HJ905 switchboard is adopted by the telephone stations of many industries. When individual industries have several telephone stations, it is possible for the some user switchboards to ~~use~~ the form of relays to enable the small user switchboard to have the user number continuous selection characteristic. Furthermore, when large industries require their fire-alarm telephone 119 or other special-use telephones to have more than two relay lines, the switchboard should also have the user number continuous selection characteristic. The original circuit of the HJ905 switchboad cannot satisfy this need. Many units did a large amount of work to add this characteristic to this switchboard and obtained a number of experiences of success. This paper reports one of the workable experiences.

AUTHOR: QIN Tingfa [4440 1694 4099]

ORG: None

TITLE: "Measures to Prevent the FY Relay Coil From Burned Out"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 6, 80 p 6

ABSTRACT: During the daily maintenance work process of the JZB-1 step-by-step switchboard, it was discovered that the 4-5 coil of the FY relay in the terminal connecting circuit (SV2.113.048) was frequently burned out. When that coil is burned out, the user would hear his telephone ring but when he picks up the receiver the other party cannot hear whatever he is saying. This paper explains the reason for the coil to be burned out constantly and the method to revise the circuit and eliminate such a problem.

AUTHOR: XIE Peixin [6200 1014 2450]

ORG: None

TITLE: "On the Problem of Word Distortion of the Double-headed Telegraphic Transmitter and the Method of Overcoming it"

SOURCE: Beijing DIANXIN JISHU [TELECOMMUNICATIONS TECHNOLOGY] in Chinese No 6, 80 pp 7-8

ABSTRACT: When the 64-4 double-headed telegraphic transmitter was used to send telegrams, the author and colleagues discovered the following 2 types of word distortion: (1) One of the words of F,A,U,K etc. is added to the end of a telegram after its transmission has been completed. (2) When the 2 heads, A and B are used for cross transmisstion, one additional word appears between the 2 telegrams. These 2 distortion phenomena can create mistakes and delays in international telegraphy or in automatic telegraphic transmission. This paper reports an analysis of these phenomena and the method of improving the circuit to eliminate them.

6168
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END

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21 November 1980

China Report

SCIENCE AND TECHNOLOGY

No. 68

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CHINA REPORT

SCIENCE AND TECHNOLOGY

No. 68

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PHYSICAL SCIENCES

THERMOCHEMISTRY RESEARCH TASKS OUTLINED

Beijing HUAXUE TONGBAO [CHEMISTRY] in Chinese No 1, Jan 78 p 13-15

[Article by Song Disheng]1345 6611 3932] of the the Thermochemistry Research Laboratory of Northwest University: "Some Views on the Development of Thermochemistry in Our Nation"]

[Text] Thermochemistry is part of chemical thermodynamics. Its main task is to study the patterns of change in energy in physical processes or chemical changes. When the state of matter changes, they are frequently accompanied by thermal effects. The values of thermal effects can be measured by the method of heat measurements, such as heat from combustion, melting heat, heat from solution, heat from mixtures, specific heat, absorption heat, and various types of heat from reactions. The data of these thermal effects can be used in solving questions in chemical thermodynamics and for thermodynamic functions such as the formation of enthalpy, free energy, and entropy. These can in turn be used to judge the direction of a chemical reaction and the limits of the reaction. At the same time, they also serve an important function in basic theoretical studies of material structures, physiology, geochemistry such as exploring crystalline structures, biological changed and mineral constitution. In addition, they are also important and indispensable data in thermomechanics, chemical engineering and other engineering designs. Therefore, thermochemistry is very closely related to the development of industrial and agricultural production and science and technology. It is also being applied by many industrial and technological departments of such industries as petroleum, chemical industry, metallurgy, explosives, atomic energy and aviation. Thus, although thermochemistry already has a history of development of over 200 years, it is still a very active field of study even today. Over 1,000 papers are being published in this field each year throughout the world, and an international academic publication JOURNAL OF THERMOCHEMISTRY is published. Some major industrial nations such as the United States, the Soviet Union, Japan, France and Britain have many people engaged in such research. The international society of pure and applied chemistry has also set up a committee on thermodynamics and thermochemistry. Although work in thermochemistry started relatively late in our nation, but under the guidance of the revolutionary line of Chairman Mao, a preliminary foundation has already been established. As our nation's socialist revolution and socialist construction develop, there will be greater development in this field to contribute toward the realization of the four modernizations.

Viewing the research and the trend in thermochemistry in the world at present, and combining the actual situation of our nation's socialist construction, the following aspects are worth our attention in developing our nation's research work in thermochemistry.

I. Elevate the Technical Level of Measuring Heat

The methods of measuring heat is the major method in thermochemical research. Improvement of the techniques of heat measurements is an important direction in thermochemical research. As science and technology develop, the need for thermochemical data will increase day by day and the precision and scope of measurements of the data will correspondingly be elevated. This requires ceaseless improvement and elevation of the level of techniques of measuring heat. The most important are:

1. Elevating the Precision of Measurements

Everyone knows that when using thermochemical data, data computations are frequently needed, and the error in the results obtained is directly related to the measured error of each piece of data. Therefore, elevating the precision of measurement of heat measuring meters has always been a question which has aroused much attention abroad. Especially at present, because of the widespread use of electronic computers in each department, many complex computational problems can be solved. For example, foreign nations have proposed the use of small scale experimental data in the studies of systems engineering in chemical industry to obtain large scale design data by directly computing them on the computer, thus eliminating the necessity of going through multiple levels of enlargement experiments. This greatly elevates the scientific level of designing and shortens the period from laboratory research of a product to large scale production. Therefore, experimental data (including thermochemical data) must be sufficiently accurate, and the elevation of the precision of measurement of thermochemical data, whether in the study of scientific theory or in actual production, has very important practical significance.

2. Expanding the Scope of Heat Measurements

In the past, of all thermochemical data measured, most were obtained under normal temperatures and pressures. To adapt to the development of modern science and technology, some thermodynamic data under special conditions are also needed. For example, the atomic energy industry and metallurgical industry need thermodynamic data taken under high temperatures. Low temperature engineering requires thermodynamic data taken under low temperatures. Geological research of the causes of formation of minerals also need thermodynamic data under high temperatures and high pressures. At present, foreign nations already have reported obtaining thermodynamic data under 3900K and 0.001K. Therefore, launching the work in measuring thermochemical data under high and low temperatures and high pressure is an important task.

3. Developing Techniques of Measuring Microunits of Heat

During the past 20 years, the development of the thermometer of micro-units of heat has been relatively fast. It can measure changes in the amount of heat of 10-7 joules. This is not only very necessary to the measurement of the processes of change in ordinary small amounts of heat but also is an indispensable means of measurement in the study of the changes in the amounts of heat during slow reactions and in the processes of change in biochemistry.

4. Engaging in the Study of New Methods to Measure Heat

The method of heat measurement is directly related to the measurement of thermochemical data. At present, a standard for heat measurements and some urgently needed means to measure heat must be established in accordance with the actual need in the realization of the four modernizations, such as devices to measure the amounts of heat of high temperatures and low temperatures. On the other hand, modern and advanced scientific technology must be applied to the measurement of heat as much as possible so that the methods of heat measurement can develop towards simplification, accuracy, rapidity and automation. The research and development of instruments to measure heat and record temperatures must be emphasized. They must be commercialized as much as possible for production of fixed models for popularization and application.

II. Systematically Measure Thermochemical Data

At present, the work of measuring thermochemical data in the nation lags far behind the needs in production and scientific research and a systematic study is lacking at the same time. In utilizing some thermochemical data, often they cannot be found, therefore, it is necessary to develop systematic measurements of thermochemical data. Expecially in combining our nation's present situation, the data urgently needed by the petrochemical industry, natural gas industry, metallurgy and raw materials industry, geology and national defense industries should be studied as key points.

III. Strengthen the Evaluation of Thermochemical Data

As science and technology continue to develop, there will be more and more accumulation of thermochemical data. With the ceaseless improvement in the techniques of measuring heat, the precision of the data of the same substance measured by different people or different methods will not be entirely the same. This requires compilation and evaluation of the data for reference. Foreign nations have always paid much attention to this work, there are corresponding plans and organizations and there is appropriate division of labor and cooperation and coordination. For example, The American Petroleum Association has sponsored the work of evaluation of APIRP44 numerical data continuously for over 30 years and has gathered and evaluated data on the physical properties, thermodynamic properties and spectral data of derivatives of sulphur and nitrogen related to petroleum and carbohydrates. The Soviet Science Academy has sponsored the compilation of "the thermodynamic properties of chemical substances" over 10 years. An addenda was published in 1970. It is absolutely necessary to gather and compile tables of thermodynamic data suitable to our nation's agricultural and industrial production and scientific and technological development. For several years, some production design departments have done some very precious work in this regard. In the future, there should be an overall plan, division of labor and cooperation and coordination to do this work well.

IV. Develop the Study of Thermochemical Dynamics

In recent years, the concept of thermochemical dynamics has emerged abroad. It is worth our attention. It not only studies the energy changes of a chemical reaction from the beginning state to the final state, but also studies the energy changes that reflect each stage of the reaction, and dynamic parameters are computed from these changes, for example, the progression of the reaction, active energy, frequency factors. It can be said that it is an interdiciplinary field of thermochemistry and dynamics. This is very helpful to the study of the mechanism of chemical reactions and has opened up a new realm for the development of thermodynamics itself.

V. Strengthen the Study of the Theory of Chemical Thermodynamics

Thermochemistry is a part of chemical thermodynamics. Its basic theoretical study includes the study of the theory of heat measurement. The study of the theory of chemical thermodynamics should be strengthened on the basis of practice. In recent years, because of the accumulation of spectral data and the development of statistical thermodynamics and the theory of structures, macro-thermochemistry and microstructures have been joined together, much progress has been made in the computation of thermodynamic properties of compounds using theoretical or semi-empirical methods based on molecular theory and already available experimental data. For example, the proposed method of computation of heat generated by carbohydrates has already reached the same precision of experimental data. Therefore, sufficient emphasis should be placed on the study of the theory of chemical thermodynamics, including statistical thermodynamics and irreversible thermodynamic processes.

In addition, strengthening organization of research in thermochemistry and realizing academic exchange between research at home and abroad are all significant to pushing forward the development and deepening of our nation's work in thermochemistry.

The above are some simple opinions concerning our nation's development of thermochemistry to stimulate discussion so that our nation's research work in thermochemistry can contribute towards the realization of the four modernizations under the wise leadership of Chairman Hua and the guidance of the policy line of the party's 11th Congress.

9296
CSO: 4008

PHYSICAL SCIENCES

FUTURE OF RARE EARTH CHEMISTRY IN CHINA PROJECTED

Beijing HUAXUE TONGBAO [CHEMISTRY] in Chinese No 2, Mar 78 pp 1-2

[Article by Su Qiang [5685 6973] of the Jilin Applied Chemistry Institute of the Chinese Academy of Sciences: "Development of Rare Earth Chemistry"]

[Text] Although the study of rare earth chemistry has already had over 180 years of history, a lot of time during the early period was devoted to studying the separation of single rare earth elements, because rare earth elements belong to the lanthium family of elements with very similar chemical properties. For a long time the study was limited to the application of mixed rare earth elements. It was not until 1947, when ionic exchange was used to solve the problem of separation of pure and single rare earth elements, that the research work in rare earth chemistry truly began to develop, only about 30 years ago. It can thus be seen that although people discovered and began to recognize rare earth elements a very long time ago, the research in the properties, theory and application of rare earth elements is a field with only a short history.

For the past more than 30 years, the production of rare earth elements has been greatly increased abroad because of the use of new techniques and new methods such as ionic exchange and extraction by solvents, and thus the prices have continuously dropped. In application, breakthroughs have been realized one after the other in petroleum cracking catalysts, laser materials, red fluorescent powder in color television, permanent magnetic materials and steel and iron materials. A lot of work has also been done in the study of the properties of single rare earth elements and in the study of basic theory. Thus new materials of rare earth elements have continuously emerged.

Our nation has a very rich store of rare earth resources. During the 28 years after Liberation, our nation has carried out a lot of work in geology, selection of minerals, smelting, extraction, separation, analysis and application to develop and utilize rare earth resources. Our nation's rare earth elements industry and rare earth elements work teams have been established, and they have made some achievements unique to our nation, and enabled rare earth elements to realize definite functions in our nation's socialist construction. To realize modernization of science and technology, surpass the world's advanced levels, there must be a rich scientific practice, accumulation of science and massive amounts of basic data of our own nation to summarize new discoveries, new concepts, new models, and to form a complete theoretical system to stimulate continued emergence of new techniques, new technologies, new materials, new equipment and new scientific fields.

Looking at the next 23 years in the future, there will be the following developments in the rare earth chemistry:

1. Further understanding of the electron models of the atoms and ions of the lanthium family elements, the energy levels, the structure of energy bands and the patterns of motion of 4f electrons will be gained, and from this understanding a relatively more complete theory of crystal fields of energy level splitting can be established, as well as theories of the exchange function between 4f electrons and conduction electrons, and conduction electrons, and theories of the f-f and f-d jumps between energy levels. The bonding ability and the degree of covalence of the 4f electron in chemical reactions will be understood, and the shielding effect of $5S^2 5P^6$ and the shrinking effect of the lanthium family upon the chemical and physical properties of elements of the lanthium family will be understood. There will be a further understanding of the pattern of change of the properties of lanthium family elements following changes in the atomic numbers and the position and the pattern of change of yttrium in the lanthium family. These will be compared to the elements of the actinium family having 5f electrons. This work will enrich and develop the understanding of the periodic law.

2. The fields of study of the composition, structures and properties (especially physical properties) of rare earth metals, alloys, metallic compounds, compound oxides, compound halides, sulphur family compounds, nitrogen family compounds and other compounds and their synthesis with complex compounds are still very active. During this period, as new compounds are synthesized and as the distribution of these in the two phases is studied, new separating systems of greater separating factors will emerge and the combination with new continuous and automatic multiple repetitive chemical industrial operations will produce new progress in the separation of rare earth elements. There will be discoveries of more non-trivalent rare earth elements and their compounds, and these will be used to separate and produce new materials with chemical and physical functions. The study of rare earth complex compounds will expand from oxygen containing coordination bodies to coordination bodies containing S, N, C and metallic organic compounds, from water solvents to non-water solvents, and into the realm of complex catalysis, luminescence of solvents, and inorganic organisms.

3. With the use of new techniques and new equipment of the electronic computer and automatic controls, the period for the separation, analysis and study of rare earth elements will be shortened. As the technology of extraction and separation of rare earth elements is perfected, as the cost is lowered, and as deeper understanding of massive numbers of rare earth metals and the synthesis of their compounds and their chemical, physical and biochemical properties are gained, more rare earth allow systems, rare earth catalytic systems, rare earth magnetic materials, rare earth luminescent materials, rare earth laser materials that use new wave lengths and miniaturized rare earth laser materials, new types of glass, porcelain materials and noncrystalline thin films possessing special functions will emerge.

During this period, there will be a deeper understanding of the transport properties of rare earth materials, and thus it may be possible to discover application for rare earth semiconductors, rare earth superconductors and photoelectric, thermoelectric and high temperature electric conduction of rare earth elements and solid electrolytes of rare earth elements. Rare earth elements will also serve in environmental protection and the development of new energy sources.

Expanding the application of rare earth elements is a task possessing mass character and comprehensiveness. As the knowledge about rare earth elements and the applied sciences becomes widespread in our nation, a situation of a mass character in the application of rare earth elements will be formed, thus greatly pushing forward widespread application of rare earth elements of our nation in the metallurgy of ferrous metals, metallurgy of nonferrous metals, machinery industry, petrochemical industry, glass and procelain industry, electronics, medicine, building materials, light industry, national defense and agriculture.

In the next 23 years, let us work hard to create a theory of the lanthium family and to open up the treasure of rare earth elements of great potential and wide uses. We will contribute our strength towards surpassing the world's advanced levels and towards hastening and realization of our nation's four modernizations.

9296
CSO: 4008

APPLIED SCIENCES

MISSILE ELECTRONIC SYSTEM RELIABILITY ANALYSIS DESCRIBED

Beijing GUANGMING RIBAO in Chinese 19 Sep 80 p 4

[Article by Wu Benyan [0702 2609 3508] and Chen Zhangbao [7115 4545 6283]: "Key Technology in Guided Missile Launches"]

[Text] On 18 May of this year, our country carried out its first launch of an intercontinental ballistic missile to a predetermined area of the Pacific Ocean with complete success, attracting interest both at home and abroad.

Of the many long-range missile, satellite and spacecraft launches carried out by several countries in the last 20 years, some have been successful and some have failed. Experience tells us that electronic systems reliability is the key to success in intercontinental ballistic missile launches. All countries involved in missile technology have organized large groups to carry on electronic systems reliability analysis.

Why is electronic system reliability analysis so important? There are several reasons. First, it is the result of the importance of electronic systems; an electronic system is equivalent to the brain, eyes and nerves of an ICBM. Second, it is because ICBM electronic systems are huge and complex, with many components and connections, and if just one component or connection is faulty it may put the entire electronic system out of commission. Mathematically, electronic system reliability is exponentially related to the number of components: if the number of electronic system components is increased, electronic system reliability will decrease exponentially. Accordingly particular attention must be devoted to use of reliability measures with large-scale complex electronic systems. The third reason is that the operating environment of ICBM electronic systems is extremely hostile, during the launch and during flight, the on-board electronic equipment will be subject to various stresses and dynamic loads, an environment which can very easily damage electronic components, so that the reliability requirements imposed on ICBM electronic systems are much higher than those imposed on ordinary electronic systems. Finally, as strategic offensive systems, ICBM's are expensive to produce, and they must have a very high kill rate. When missiles carry satellites or spacecraft into space, it is necessary to guarantee sufficient electronic system reliability, otherwise there may be catastrophic results. Because of the unreliability of a component costing only 2 US dollars, the 2.2 million dollar US Vanguard satellite launch failed.

There are many different ways of expressing system reliability; the most commonly used is "mean time between failures" (MTBF), which is the average duration of normal operation. For example, an MTBF of 1,000 hours means an average of about 1,000 hours without malfunctions. The MTBF of some foreign electronic devices has already reached thousands or tens of thousands of hours.

In order to assure that ICBM electronic systems will be able to work reliably within the specified launch and flight time and in a hostile environment, especial attention must be paid to overall systems operation, and a series of questions such as how to design and manufacture them must be studied. As regards design, it is necessary to solve various failure problems resulting from component damage ("damage type malfunction"), drift of component characteristics ("drift malfunction"). As a result of research by many experts, certain methods of dealing with the abovementioned failures have been developed. For example, in general less than 30 percent of the rated load of ICBM electronic system components is used, thereby greatly decreasing the component malfunction rate. Decreasing the ambient temperature for components considerably lowers the malfunction rate (each drop of 10° in the temperature cuts the malfunction rate by about half). In addition, the redundancy method is generally used to assure reliability: singly redundant components can decrease the failure rate by a third, while doubly redundant components can decrease the rate by 46 percent. In addition, it is possible to predict a component's characteristic frequency and control it so that it can withstand vibration shock during the launch or flight of the ICBM. The above are only a few methods of solving the problem of damage malfunctions. Several different methods for solving the problem of circuit characteristic drift have also been developed. For example, for circuits subject to strict requirements, the circuit parameters, or standard circuit parameter variation values can be used to figure back to permissible variations for the individual components, and the like.

Electronic system reliability technologies have their own theoretical basis. The occurrence of malfunctions is probabilistic in nature, so it is hard to make a definite prediction in advance; in mathematical terms, it is random, and the corresponding type of mathematics is probability theory. Reliability mathematics is also developing continuously. At present, the degree of reliability of ICBM electronic systems can be estimated in advance by certain methods.

8480
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APPLIED SCIENCES

MISSILE TEST SHOT CARRIES CHINESE FLEET ON EPIC VOYAGE

Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, 1980 pp 2-5

[Article by Sun Xinhua (1327 2450 5478)]

[Excerpts] April XX Shanghai; Overcast, cloudy; Wind NW, force 5.

Today, the Wusong naval port of Shanhai is decked out as though for a festival. The dozen or so missile destroyers, escort ships, subchasers and other vessels moored at the piers sport multi-colored flags and pennants which flutter in the breeze.

At 0745 hours, Wang Zhen and Geng Biao, members of the Chinese Communist Party Central Committee and vice premiers of the State Council, Zhang Aiping, Deputy Chief of Staff of the People's Liberation Army, Li Yaowen, Political Commissar of the State Scientific and Technological Commission, Chen Guodong, first secretary of the Shanghai Municipal Party Committee, Yeh Fei, commander of the Navy, and others of the leadership, accompanied by Liu Daosheng, the fleet's commander and political officer, and Yang Guoyu, the deputy commander, proceeded to Pier No 3 to review the honor guard made up of 200 cadres and fighters. At this point, Chief of Staff Zhang Xu took three paces forward and reported: "Comrade Vice Premier, the fleet is ready. Please begin your inspection." With this, every ship blew its siren.

The party of vice premiers Wang Zhen and Geng Biao boarded missile destroyer No 131 and, escorted by a subchaser and pilot boat, they slowly made their way through a light sea to the anchorage at the mouth of the port of Wusong. In the conference room, they happily took brush in hand to write some words of encouragement for the comrades of the ship's complement, urging everyone to give a glorious account of himself in the name of naval modernization, national security and world peace.

Destroyer 131 arrived at Gaoqiao anchorage and Vice Premier Wang and the other leaders in turn reviewed the "Xiang Yang Hong No 5," the "Yuan Wang No 1," vessel No 107 and the seventeen other ships that comprised the mighty flotilla. The officers and men and the test personnel aborad the ships being reviewed stood at attention and saluted. The vice premier picked up a megaphone and a sonorous voice boomed out: "Here's to the fleet's successfully completion of its mission and to a triumphant and early return!" "Be grateful for the loving care of the leadership and resolutely carry out your mission!" The slogans rang out over the broad expanse of water.

The review of the formation was completed in an hour. Destroyer 131 returned, and, after it had docked at the pier, Vice Premier Wang shook hands with each of the fleet's commanders and saw them abroad the launch. It was not until the launch disappeared from view at the harbor entrance that the seeing-off party slowly departed. At 1020 hours the fleet received orders to weigh anchor and make toward the vast expanse of the South Pacific.

May XX Pacific Ocean; Light seas; Wind SW, force 5.

The sea is calm and there is no starlight or moonlight. The bows of the ships slice lightly through the waves. Except for the running lights on the ship's masts, the ocean is pitch black. In the command centers of the destroyer escorts there is an atmosphere of combat. The commanders pour over thier charts and check their bearings. In another hour the fleet will pass the Miyako Strait in the Ryukyu Islands. The Ryukyu Islands are situated between Kyushu, Japan and Taiwan and run in a northeast-southwest direction, separating the East China Sea from the Pacific Ocean. This island chain extends for approximately 650 nautical miles, is made up of 473 large and small islands and covers an area of 4,800 square kilometers; the islands have a population of 1.3 million people. The Ryukyu Islands are made up of the Osumi Islands, the Tokara Islands, the Amami Islands, the Okinawa Islands, the Sakishima Islands and the Daito Islands. There are numerous passes between the islands--major passageways from the East China Sea to the Pacific Ocean. The Miyako Strait is comparatively deep with an uneven sea floor. The fleet commander coolly issues orders to the warship escorts to fan out; they will open a passage for the range instrumentation ships and at the same time act as a steel curtain to protect them. Aboard each of the missile destroyers powerful missile launchers stand at the ready. Radar and sonar scan the skies above and the ocean below, watching and searching, faithfully carrying out their duty.

At the crack of daylight, the radarmen suddenly pick up a blip on the radar screen. "Target dead ahead one-five degrees, range two-oh-oh nautical miles, two aircraft." "Ding..." Battle stations sounds. The formation immediately goes into No 1 alert status. It turns out to be two Japanese MSDF reconnaissance aircraft. When they have determined that we are Chinese naval vessels they at once waggle their wings in a gesture of friendship. Our formation resumes course and passes through the Miyako Strait on its way to the South Pacific.

May XX Pacific Ocean; Scattered to dense clouds; Moderate swells, light waves.

Suddenly, the escort formation receives a message: "Probable typhoon forecast on your course for tomorrow--make typhoon preparations." The fleet commander makes the decision to have the destroyers refuel.

Refueling at sea the major way to increase the sailing duration of the warships. The duration and self-sufficiency of a destroyer are limited and if the problem of refueling at sea is not resolved, the destroyers would be incapable of leaving base for prolonged voyages into the Pacific Ocean. On this day, although the seas were slight, the ships were rolling at 10 degrees. As Vessel 107 and the oil and water supply ship X950 maneuver toward each other at a distance of 40 meters or so, the surging waves are violent and if firm control is not maintained it is easy for a collision to occur. The captain calmly orders the helm to adjust the heading and maintain [course] without deviation. At just the right moment, when the two ships are steaming side-by-side, a rocket roars off the X950 and comes down precisely in the middle of the deck of Vessel 107. Then a line is pulled over bringing with it a wire rope. In a few minutes the oil and water lines are connected and the heavy oil and fresh water flow into Vessel 107, enough for several days' steaming.

In the hours just before dawn of the second day, just as predicted, the sky over the Pacific is blotted out by dark clouds. The wind rises to force 7 and the rain thunders down. At that time, there was a tropical low pressure system over Kwajalein Island moving on the same heading as the fleet. The sea seemed to go crazy. The 20,000-ton range instrumentation ship bobbed about wildly and the missile destroyers, which only displace several thousand tons, bucked around violently, as though they had been tossed into a spindrift, their masts and antennas frequently hidden by the waves.

Actually, this kind of weather was a real test for both ships and men. The Chinese-built missile destroyers were steaming in the Pacific Ocean for the first time and the commanders and fighters they carried had much hope, spirit, and courage, for how could a weakling face the Pacific Ocean? After a month's hard sailing, not one among the several thousand seamen was seasick again. No wonder everyone says jokingly that the word "seasick" ought to be dropped from the navy's dictionary.

May XX The South Pacific; Light seas; Light breezes.

After a hard voyage of more than 3000 nautical miles, the fleet would, in half a day's time, cross the equator and enter the South Pacific! It was indeed an unforgettable moment.

In the afternoon the bridges and decks of the ships were packed with people; everyone was enjoying the exotic atmosphere of the southern hemisphere. The sea near the equator is characterized by dazzling sunshine and gentle breezes. The sky is filled with floating rosy clouds--just like holiday fireworks displays. The bright blue sky and the peaceful ocean seem as one. All at once some flying fish spring from the surface. As it turns out, the temperature here remains pretty much constant at 30 degrees C and the rising air currents create a belt 600 nautical miles wide north and south of the equator where there is no wind.

The warships continue on their voyage and at 2234 hours the fleet commander makes a startling announcement over the PA system: "In another 25 seconds, the fleet will cross the equator!" The ships of the fleet blow their sirens for a minute and the shrill blasts shatter the peaceful darkness. For a long time, the sky above the Pacific reverberates with the sound. Sailors on the decks cheer: "We've entered the South Pacific!" "We've leaped into the southern hemisphere!" The fleet command centers were even noisier. Reporters busily took snapshots of everyone for mementoes. The fleet's deputy commander carefully entered the following in the ship's log: In carrying out the mission of the launch vehicle experiment, the destroyer formation, at 1834.25 hours Beijing time, at 150°28'58" east longitude, crossed for the first time the equator and entered the South Pacific." So it was that a Chinese destroyer formation was making its first voyage in the South Pacific.

May XX At the equator, South Pacific; Moderate swells, light waves.

Perhaps an uneventful voyage is quickly forgotten but a difficult passage is imprinted on the brain of a sailor. The warships had left the East China Sea at 36° north latitude and had arrived at our launch vehicle test zone located at 7° south latitude, passing on the way Japan, the Philippines, Indonesia and Papua New Guinea. They had passed through the Ryukyu Islands, the Mariana Islands, the West Caroline Islands and the Solomons. They had stepped over the temperate zone, the subtropics and the tropics.

At midday, the blazing fireball of the sun heats the decks to more than 50°C. The engine room personnel have been below decks for less than 2 hours yet their clothes are soaked with sweat. Some of the comrades were beginning to develop sores around their mouths--the result of not having fresh vegetables for several days. Then the freezer went out and over a hundred ducks began to go bad and had to be thrown overboard to feed the fish. The supply of fresh water carried aboard ship was limited and had to be rationed. Life became hard. Faced with the intense heat, the fleet and ship party committees organized all hands to wage a war to beat the heat. Night after night they organized personnel to regulate the air conditioning equipment, changed the engine room ventilation intakes and took the appropriate steps, relying on the strength and determination of the sailors, to put an end to the ongoing oppressive heat.

May XX The South Pacific; Wind SE, force 5; Light seas.

The date for China to fire its launch vehicle is drawing near. For several days, certain countries have been dispatching warships and aircraft to our region of the ocean to conduct surveillance activities. Some of these aircraft drop sonar buoys near our ships and in order to monitor the missile's flight path to the splashdown zone, some foreign vessels conduct electronic surveillance. They also deploy anti-missile warning systems.

In order not to jeopardize either our launch experiment or the safety of the foreign vessels and in order to avoid monitoring of the launch vehicle splashdown zone by the foreign aircraft and ships, the fleet commander decided that from 6 o'clock on, every ship would display the "UR" international pennant (meaning: "Stay clear, am conducting exercise").

At 0330 hours on the second day, while the sailors are fast asleep, the destroyer escort received orders to immediately conduct a sweep of an area approximately 20 nautical miles in circumference around the splashdown point and to permit all foreign vessels to exit the zone. At the same time, the command center reviewed the ocean and atmospheric conditions and decided to dispatch a group of vessels to split up and keep an eye on the foreign vessels. Concurrently, the fleet made clear the mission of each ship to safeguard and retrieve the rocket's instrument package and to take seawater samples.

"Ding..." The loudspeaker sounds battle stations. Instantly, the entire fleet seethes; the sailors race to their individual battle stations. The radar antennas spin and the sonar emits its steady pings, searching for undersea targets. After a search of almost 3 hours, they failed to turn up any target whatsoever in the splashdown zone.

But there were two foreign vessels some 30 nautical miles outside the impact point and Vessel 106 sent an advisory signal. One of the ships continued to make for the impact point. Vessel 108, without taking steps to intercept, kept sending: "Our two peoples are friendly. For safety's sake, please remove yourself from our operations area." Our goodwill advisory was understood and shortly thereafter the ship sent its second officer over to make a present of the ships insignia and a uniform cap to vessel 108. It was indicated that the Chinese Navy's advisory had been received and there was no intent to create a disturbance at sea. We reciprocated by presenting the ship with a pine bird carving from Dalian and a case of Qingdao Laoshan Beer.

Suddenly, off the port bow of Vessel 107 a dazzling red ball--like a shooting star--trailing a white plume from space came screaming down and with a thunderous roar threw up a column of water a hundred meters high. In less time than it takes to tell, the destroyer formation raced in from all around the impact zone. At the same time, the recovery vessel launches its helicopter which swoops down upon the point where the missile instrument package splashed down and hovers 30 meters over the surface of the ocean. Frogmen quickly descend a ladder and leap into the ocean. With quick and nimble movements, they take only 5 minutes 20 seconds to recover the instrument capsule. Then, from every control center and deck of every ship comes an ear-splitting shout: "The missile shot is a success." "We've done it!"

CSO: 4008

APPLIED SCIENCES

FULL-RANGE TEST OF LAUNCH VEHICLE MARKS NEW PLATEAU IN CHINA'S SPACE EFFORT

Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 7, Jul 80 pp 3-5

[Excerpts] The morning of 18 May. Visibility unlimited. A thunderous roar shakes the launch site somewhere in China. A large launch vechicle lifts off, punches through the clouds, flashes across the heavens and heads toward the South Pacific. After a 10-minute flight in outer space, it re-enters the atmosphere and splashes down precisely on the pre-arranged ocean target zone, successfully winding up China's first large-scale launch vehicle flight test. The success of the test demonstrates China's new advances in launch vehicle technology.

Why Flight Tests Are Conducted With a Launch Vehicle

A launch vehicle, if employed to insert a satellite or space vehicle into a predetermined orbit, is referred to as a space vehicle "carrier rocket." If it is employed to carry nuclear warheads over vast distances to destroy vital enemy targets, it is referred to as a ballistic missile. Ordinarily, a launch vehicle capable of putting a satellite into an orbit having a perigee of 300 kilometers is also capable of placing a warhead of equal weight on a target 8000 kilometers away. Correspondingly, a ballistic missile with an 8000-kilometer range is called an intercontinental ballistic missile [ICBM]. It is obvious from this that a launch vehicle and an ICBM are siblings differing only in the nature of their payloads and in the purpose for which they are used. Hence, in the design, research and development, and testing of both the launch vehicle and ballistic missile, there are many similarities. In fact, launch tests of a space vehicle "carrier rocket" are often carried out jointly with flight tests of ICBM's.

Flight tests are an indispensable part of the development of both rockets and missiles and are the final stage of the developmental work. No matter what kind of new product is being developed, extensive testing is required. The more complex the product, the more involved the tests and the more varied the procedures. Large launch vehicles and ICBM's are extremely complicated systems involving the power plants, guidance systems, and the rocket structures.

How the Flight Test of a Launch Vehicle is Organized

Large launch vehicles have ranges of 8000 kilometers to more than 10,000 kilometers. Because [most] countries have limited open spaces within their territories, full-range overland tests cannot be conducted. They must turn to the oceans, which occupy 71 percent of the earth's surface. Both the U.S. and the USSR use the Atlantic and Pacific oceans to conduct maximum range tests with their launch vehicles and ICBM's. China opted to use an open region of the South Pacific as the site to conduct its launch vehicle test. Ocean testing makes it necessary for tracking, data capsule recovery, ocean communications command, rear services support, etc., to be conducted at sea, which means many new problems for the preparation of the flight test. Both the United States and the Soviet Union, before holding maximum-range tests, first carried out a selection of the splashdown site, made hydrological, meteorological, and geological studies and devised highly accurate tracking equipment. They had to develop, modify and build anew all kinds of monitoring gear, large monitoring vessels and aircraft for ocean tracking and had to hold ocean communications tests. In addition, safety hazards can develop from mid-flight burnout and other malfunctions and this requires highly reliable safety remote control equipment.

Also, tests on the high seas can involve international shipping and air lanes and as a result, on the eve of the test, an announcement must be made declaring the date of the test and the off-limits area of the ocean. The monitoring ships and the recovery vessels must reach the designated area beforehand to prepare for the operation. Weather probe rockets are launched at the launch site and by the vessels at the splashdown zone and weather radar begins to monitor the weather and issue weather forecasts so that the launch can be made under optimal conditions. Target communications systems assure the coordination of the monitoring and communications equipment of the several hundred stations along the 10,000-kilometer route between the launch site and the splashdown zone. It is obvious that a full-range flight test of a large launch vehicle is a complicated large-scale experimental process requiring extensive preparation time, strict organization and direction, and technical coordination. It touches on many sophisticated aspects and systems of science and technology. So the successful full-range flight test of a large launch vehicle reflects a nation's level of science and technology.

Flight Test Zone and Installations

The launch is the key link in a successful flight test of a launch vehicle. If the launch isn't just right, a successful flight cannot take place.

The remote launch site has a command and control center, a communications center, a meterological installation, a data processing center and the full run of optical and readio measuring equipment for tracking and monitoring.

The command and control center provides unified command, control and coordination for the tests and the tracking and monitoring installations as well for all concerned quarters participating in the tests. The command center has the command and control stations and various display equipment.

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ENCOURAGED BY SUCCESSES, CHINESE MAP OUT FUTURE SPACE PROGRAM

Beijing XIANDAIHUA [MODERNIZATION] in Chinese Vol 2 No 10, 16 Oct 80 pp 3-5

[Article: "Ten Years of Chinese Satellites"]

[Excerpts] On 24 April 1970 China launched its first satellite, the "East Is Red No 1." Chinese space technology had created a base out of nothing. In 10 years eight satellites have been successfully launched one after the other. Of special note was the successful return to earth of a satellite, demonstrating that our space technology had undergone further development. China has now established a comprehensive ground monitoring and control network, computer centers, and launch pads. We have established specific bases for satellite research and development and production and large-scale environmental experimentation. In addition, a corps of young space technicians has been forged.

Chinese Space Technology Forges Ahead

Launching a satellite requires complex and modern systems engineering, broken down into five components: The satellite, the launch vehicle, the launch pad, ground tracking and command centers and a satellite and launch vehicle information center. These five systems are mutually supportive during the R&D and launch phases, forming one large system. This large system involves many scientific and technological disciplines, for example rocket technology, radio technology, automatic control technology, astrophysics, space materials, etc.

In 1968, with the deep concern of the party Central Committee, China established its Institute of Astronautics. Its chief mission is to draft the programs for the development of space technology, to be responsible for the design of all vehicles, research and production, to conduct the research and application of space technical sciences and to handle foreign [technical] exchanges and cooperation. Two years after the establishment of the Institute of Astronautics, China launched its first satellite.

Early Broadcast Satellite and Scientific Research Satellites

China's first satellite, the "East Is Red No 1," was an early broadcast satellite. Its chief function was to broadcast the song "East Is Red" to the world and at the same time to transmit the pertinent engineering parameters of the satellite's parts and instruments so that subsequent designs could be improved. The heart of the instrument package was the generator for the song "East Is Red," its principal components being six oscillators. Another important instrument was the telemeter, the task of which was to measure the satellite capsule's pressure and temperature and to monitor the electronic instruments, power source, and other parameters. The "East Is Red No 1" had a perigee of 439 kilometers and an apogee of 2,384 kilometers. The orbital plane was inclined 68.5 degrees from the equator and orbital time was 114 minutes. Its weight was 173 kilograms, compared to 83.6 kilograms for the first Soviet Sputnik and 8.22 kilograms for America's first satellite.

Less than a year later, China, in March 1971, launched a scientific research satellite. Its primary function was to measure the geomagnetic field, X-rays and cosmic rays and other space environmental parameters. An additional task was to test new satellite technology such as solar batteries and passive temperature controls, etc.

The external configuration was a multi-facet sphere on which were 20-odd solar battery panels. The satellite contained a round hermetically sealed compartment which housed a magnetometer and a radiation monitoring device, electronic instruments, a silver-zinc storage battery, etc. Between this compartment and the outer shell there were four small instrument compartments containing telemetry devices. Various space environmental monitoring devices were carried on the outer shell. The weight of the satellite was 221 kilograms; perigee was 226 kilometers and apogee was 1,826 kilometers. Orbital inclination was 69.9 and orbital time was 106 minutes. Satellite spin program began following separation from the rocket. As the solar battery collector panels fed a constant power supply to the storage battery, the generator for the telemetry remained functional until 1975.

More Advances: The Return of a Satellite

At this time research commenced on a returnable satellite to enable China's space effort to make new advances.

China's first successful returnable satellite was launched in November 1975. After she was aloft for a period of 3 days, according to plan, she was successfully returned to earth. At this point, China became the world's third country to master recovery technology.

In December 1976 and January 1978, China launched two recoverable satellites. With improved precision, gratifying results were obtained and a great quantity of information and imagery through remote sensing was collected, supplying all quarters of the people's economy with valuable data.

The launching of a recoverable satellite enhanced the status of China's space science and technology. The satellite carried remote sensing devices designed in China. The experiments involved three-axis stabilization attitude control technology, thermistor [?] temperature control technology, satellite recovery technology, heavy-thrust launch vehicle technology and launch and monitoring technology. The experiments will serve China's development of manned space-craft and space labs.

Launch Vehicles

Satellites cannot be launched without launch vehicles. For 10 years China has employed two types of launch vehicle. One has a maximum thrust of 100 tons. It has a two-stage liquid fuel engine. The other has a maximum thrust of 200 tons. It is a three-stage launch vehicle.

The launch vehicles have stabilization and attitude control systems. Ignition, shutdown and separation are all carried out according to a certain sequence and at pre-arranged velocities. The rocket carries instruments to measure flight velocity. When the rocket reaches these velocities, the instrument emits a radio signal which, after amplification, controls the motors' ignition, shutdown, separation and other operations.

The Future of China's Space Science

The satellite is a modern implement of production, a kind of advanced productive power. Satellites have already become indispensable implements for transportation and communications, posts and telecommunications, meteorology, science, culture, and other quarters of the people's economy. What developments will China's space effort undergo in the 1980's?

The development of satellite communications and the research and development and launching of synchronous communications satellites will transform China's backward posture as regards communications, especially in that it will be possible to resolve the communications problems in western China. The so-called synchronous satellite is a satellite which orbits at the same speed as the rotation of the earth. Synchronous satellites fly parallel to and some 36,000 kilometers above the equator, motionless, and can relay ground television and telephone signals.

Aboard the satellite a control system maintains the satellite in a stationary position. If the tug of the sun, earth or moon causes the satellite to move, the control system will return it to its original position. The technology that enables the satellite to maintain this fixed position is referred to as "fixed-point holding technology." Fixed-point margin of error is generally required to be approximately 1 degree. These satellites also carry solar batteries and microwave transmitters and their antennas.

China wants to develop satellite broadcasting--to research and develop a Chinese broadcast satellite for television transmissions. Broadcast satellites are also synchronous but the technical specs are more complex than those for communications satellites. They require a more powerful energy source, which is to say that they must carry solar panels with a large surface area. These panels are folded up inside the launch vehicle. As soon as the satellite is inserted into a synchronous orbit, the solar panels deploy and convert solar energy into electrical energy for the broadcast transmitter. Fixed-point accuracy requirements for a broadcast satellite are higher than those for a communications satellite, the current international standard being ± 0.1 to ± 0.05 degrees.

China is also preparing to develop satellite natural resources surveys, and to research, develop and launch such satellites. The use of these satellites for large-scale resource surveys of highlands and mountainous regions and for gathering information on earthquakes, currents, environmental pollution, forest fires and agriculture saves enormous amounts of manpower and material. Even more wonderful is the fact that satellites can also engage in archeological studies, finding cities buried beneath sands and earth. The natural resources survey satellites China plans to launch include those fitted with multi-spectroscopes and microwave and infrared remote sensors. The satellites would be in polar orbits or solar synchronous orbits. Polar orbits are perpendicular to the equator and pass over the North Pole and the South Pole. Solar synchronous orbits are orbits inclined 98 [sic] degrees from the equator which carry the satellite over a designated region at a fixed time each day.

China is also preparing to develop weather satellites to collect meteorological data over broad areas in an effort to improve weather forecasts. Today, China receives cloud charts from foreign meteorological satellites but some data (for example, wind velocity, temperature, etc.) are not as easily obtained. Therefore, researching and developing our own weather satellite is a must. These meteorological satellites also fly in a polar orbit or synchronous orbit.

Table 1. Previous Chinese Earth Satellite Launchings

Order of Satellite	Purpose	Principal On-board Instruments	Launch Date	Satellite Weight(kg)	Orbit Parameters			
					Perigee(km)	Apogee(km)	Inclination	Periodicity
No 1	To broadcast "East Is Red"	Music transmitter, remote sensors	4/24/70	173	439	2,384	68.5	114 mins.
No 2	Space environment survey	Survey instruments, remote sensors	3/3/71	221	266	1,826	69.9	106 "
No 3	Scientific research	Electronic instruments	7/26/75	1,200	186	464	69	91 "
No 4	Recovery experiment	Remote control instruments	11/26/75	1,900	173	483	63	91 "
No 5	Scientific research	Electronic instruments	12/26/75	1,200	183	387	69	90 "
No 6	Scientific research	Electronic instruments	8/30/76	1,200	--	--	--	--
No 7	Recovery experiment	Remote control instruments	12/7/76	1,900	167	489	59	91 "
No 8	"	"	1/26/78	1,900	159	482	57	91 "

CSO: 4008

BRIEFS

MARITIME SATELLITE NAVIGATION--The first batch of shipboard satellite navigation receivers to be developed by China has been put to use on ships making long voyages. Performance has been excellent. Satellite navigation is the latest in maritime navigational technology. China's shipboard satellite receivers have all-weather, world-wide capability. They resist interference, possess a high degree of accuracy, and are very stable. In May 1980, when China conducted its launch vehicle tests in the Pacific, these satellite navigation receivers played a vital role. Every survey ship, range instrumentation ship and recovery vessel on this long voyage was equipped with these receivers, assuring the successful completion of the monitoring and recovery missions of the fleet. This batch of shipboard satellite navigation receivers was the product of a joint effort by concerned industries, research units and factories. [Text] [Beijing RENMIN RIBAO in Chinese 30 Oct 80 p 1]

CSO: 4008

LIFE SCIENCES

HEALTH MINISTER INSPECTS CONDITIONS IN TWO HEBEI COUNTIES

Beijing GUANGMING RIBAO in Chinese 1 Aug 80 p 1

[Reportage by reporters Zhang Xiluo [1728 6007 3157] and Fan You [3058 0642]: "Public Health Minister Goes to Rural Areas 'With a Light Pack'"]

[Text] Early in the morning on 17 July, Qian Xinzhong, minister of public health, together with Vice Minister Guo Ziheng, rode in a bakery truck to the rural areas of Hebei to investigate and study public health work. In early June, Minister Qian Xinghong had led a delegation on a visit to America lasting over 10 days, returning to Beijing on 2 July. Only half a month separated his return from abroad and his going down the countryside.

Since the beginning of this year, Minister Qian Xinzhong and vice ministers Wang Wei, Yang Shoushan, Huang Shuze, and Cui Yueli have, one after another, gone to the rural areas for investigation and study. After the two documents concerning agriculture were handed down by the central authorities, great changes occurred in the vast rural areas. With the new situation in public health work in the rural areas, Comrade Qian Xinzhong selected Baxian County and Gu'an County in Hebei Province as the places where he would take another look at how this work should be strengthened and improved.

After the smashing of the "gang of four," a question in dispute was whether to provide cooperative medical services. Qian Xinzhong on his first visit found that the broad masses of rural cadres and commune members welcomed cooperative medical services, but the question was whether, based on different economic conditions, different methods could be adopted, and not simply pursue free medical care. They held that in places where the collective economy base is fairly small and collective medical services cannot be provided, fees can be charged for seeing a doctor, thus insuring that there will be doctors and medicine in the rural areas and that if a peasant falls ill someone will care for him. But the "barefoot doctors" should not be disbanded. Baxian County and Gu'an County provide collective medical services suited to local conditions and in the spirit of seeking truth from facts, and these services are fairly flexible and diversified. In reducing the proportion of medical expenses, they pay a fair amount of attention to the collective welfare of the commune members who receive medical treatment, linking this with the individual's necessary burden of the cost. For some commune members, the cost is reduced by about 50 percent, for others it is reduced by less than 50 percent, and for still others the cost of the medical treatment is reduced but not the cost of the medicine. Only a tiny minority receives medical treatment completely gratis. After making on-the-spot observations and conversing with cadres and commune members, the minister and vice minister felt that the past practice of seeking at one stroke and one sidely to raise the rate of free medical treatment led to many cooperative medical stations "operating in the spring and fizzling out in the autumn," viz, in the second half of the year they had no money for expenses. Practice proves that wealth is not equally distributed in the rural areas throughout our country, and it won't do to rigidly line them up in tidy order.

Qian Xinzhong and his party praised Baxian County and Gu'an County for starting out from reality, with the spirit of seeking truth from facts, in providing cooperative medical services. At the same time, he raised the point that, as the economy of the rural areas develops and the life of the peasants improves, the demands made on medical treatment and hygiene increase, and cooperative medical services inevitably will not be able to stop at treating minor injuries and minor ailments. In production brigades where the economy is good, the cooperative medical services must accumulate some funds and use them to improve equipment, expand the number of medical services, and improve the treatment of "barefoot doctors," striving hard to motivate the "barefoot doctors" to study their profession intensively and improve their technical level continually.

Qian Xinzhong and his party found that Hebei Province has taken the training of "barefoot doctors" seriously and has tested them at regular intervals. After over 700 of the more than 900 "barefoot doctors" in Baxian County had passed their qualifications tests, Qian Xinzhong said: "The raising of the technical level of 'barefoot doctors' has an extremely large bearing on the conslidation and development of cooperative medical services. The entire country must strengthen the work of training and testing 'barefoot doctors.'" Both Qian Xinzhong and Guo Ziheng are leading cadres who know their business. They went to clinical examination rooms in the counties' hospitals and looked at their medical records, and they also conversed with medical and nursing personnel and with patients.

They noted that the two counties managed well nightsoil and water, thereby promoting higher foodgrain output. Qian Xinzhong told the commune and production brigade cadres that some places only look at nightsoil and water management as being the affair of public health departments. Your practice, he said, proves: Good management of drinking water insures that the peasants rarely fall ill and that the labor force is protected; good management of nightsoil helps the soil fertility to be high so that agriculture can increase its output. The management of drinking water and the management of nightsoil are two key questions in rural public health work, and everybody should get a good grip on them.

When Qian Xinzhong went into the countryside, he stayed at an ordinary hostel. The arrangements for the daily activities of those staying at the hostel were very strict, and after eating breakfast at 6:30 am they set out for work, frequently returning for their evening meal at 7 or 8 pm. For several days, the temperature was high, but 68-year-old Qian Xinzhong stood up to the scorching sun and braved the intense heat of summer. In the two counties, he visited the county-level medical and public health personnel, "barefoot doctors," and patients, gathering their ideas. Everybody was favorably impressed with the workstyle of the responsible person of the Ministry of Public Health in going down to the countryside "with a light pack" to investigate the new situation and solve new problems.

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CSO: 4008

PLA HOSPITAL DEVISES PULMONARY BLOOD FLOW CHART

Beijing GUANGMING RIBAO in Chinese 1 Aug 80 p 1

[Article by Liu Anlong [0491 1344 7893], Shi Kungu [0670 3824 3768], and Xiang Chun [0686 2504]: "New Theoretical and Practical Breakthrough"]

[Text] Hospital 211 of the PLA Shenyang Units began in 1975 to do research work on a pulmonary blood flow chart. The Shanghai Chest Hospital, the Harbin Municipal Chronic Tracheitis Prevention and Treatment Research Institute, and the General Hospital of the Shenyang Units have vigorously cooperated with it in this research. After repeated experiments on animals and a great amount of clinical tests and verifications over the past few years, for the first time the theory of "pulse movement synthesis and fluctuation [dongjing mai zonghe budong 0520 7234 9115 4920 0678 3134 0520]," was put forward, and also, having been put into practice in clinics, it corrected the long-held concept of "simple part arterial blood flow [danchun jubu dongmai xuelu 0830 4783 1444 6752 0520 9115 5877 3177]," which led to new advances in the clinical use of the pulmonary blood flow chart.

The pulmonary blood flow chart is a supplemental diagnostic method for observing from outside the body the dynamics of the changes in pulmonary blood circulation. It possesses the merits of being simple and convenient, comparatively respectable, and comparatively sensitive, and does not entail harming or operating on the patient. The pulmonary blood flow chart was developed on the basis of studying the chest blood flow chart, the liver blood flow chart, and the limbs and trunk blood flow chart. Li Xishen [2621 1585 5271], head physician of Hospital 211, conscientiously analyzed the Chinese and foreign blood flow charts currently in use, and boldly traced a blood flow chart for use in treating diseases in which the changes in pulmonary blood circulation are paramount. After 1,550 clinical examinations of pulmonary emphysema, lung and heart ailments, congenital heart disease, and rheumatic heart disease, he made a new breakthrough in theory and practice. For the shape of the curves on the pulmonary blood flow chart, he first of all drew them to reflect the synthetic changes in the blood capacity of the pulmonary artery and pumonary vein, clarified the principles by which each wave pattern is produced on the pulmonary blood flow chart, and put forward an objective basis for making an early diagnosis of pulmonary emphysema and of lung and heart ailments, for judging the degree of flow differentiation and the changes in pulmonary blood vessel obstruction caused by congenital heart disease, and for making an initial evaluation of the results of an operation. The scientific research achievement of this hopsital was reported on six separate occasions at specialized meetings at the national, provincial, and municipal level, and the hospital's technical materials have been published in five kinds of military and civilian medical journals.

From October of last year to May of this year, the General Hospital of the Shenyang Units has done a great number of clinical tests and verifications and a great number of pre- and post-operative comparisons of the wave patterns on the pulmonary blood flow chart; these have all confirmed this scientific research achivement. The Medical Science and Technology Committee of the Shenyang Units recently convened a meeting at Hospital 211 to appraise the scientific research achievement of the pulmonary blood flow chart, and it held that the hospital possesses in the chart something of advanced scientific and pratical value. It also suggested that the chart be put into widespread use in qualified hospitals of the Shenyang Units.

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BENEFITS, LIMITATIONS OF PLACENTAL GLOBULIN EXPLAINED

Beijing GUANGMING RIBAO in Chinese 16 Aug 80 p 1

[Article by Xu Jiuwu [1776 0046 2976]: "Placental Globulin Cannot Be Used Indiscriminately"]

[Text] In recent years, placental globulin has entered our daily lives in an increasingly deeper and more widespread way. It has become a drug that is familiar to almost every person and every family. Not a few persons are constantly worried and run around just wanting to buy it. There is indeed a lot of talk about its benefits--from curing hepatitis, measles, etc., to relieving fever and colds. It has simply become a "cure-all" guaranteed for the treatment of hundreds of diseases. With regard to the way to use it, much confusion exists. Some people even treat it as a "nutritional supplement" and believe it can make the heart and body stronger; the more injections of it, the better.... What really is the effect of placental globulin? What is the correct way to use it? For the purpose of clearing up these questions, this reporter recently paid a visit to Prof Zhu Futang [6175 4395 2768], director of the Beijing Children's Hospital, and Prof Xie Shaowen [6200 1421 2429], of the Institute of Basic Medicine Research, Chinese Academy of Medical Sciences.

Although many persons have used placental globulin, not very many know how the drug is made and prepared, or what its active ingredients are. Professor Xie Shaowen answered these questions first. He said: "Regarding the creation of placental globulin, director Zhu Futang should have some credit. It was in 1933, during a period when Professor Zhu was out of the country to do research, that he and Professor Maikang [7796 1660, transliteration] of Harvard University obtained a globulin extract from the serum of a pregnant woman's placenta. At first they were considering using it to prevent diphtheria and scarlet fever. Later, it was gradually applied to other aspects such as preventing measles. Its active element is gamma globulin. At present, the commonly used globulin products include, aside from placental globulin, the gamma globulin made from human serum. These two drugs have the same active element. When the two are compared, the effective element content of the human serum gamma globulin is higher and more efficacious, but since it is limited by the source of human blood, the cost is high; therefore, it is still not extensively applied in medical treatment. At present, placental globulin continues to be applied more extensively [than gamma globulin].

As everyone knows, the human body has two defensive immune systems--i.e., cell immunity and body fluid immunity. Gamma globulin belongs to the product of body fluid immunity. Each one of us is regularly being attacked by various kinds of pathogenetic micro-organisms. From the viewpoint of immunology, all of these pathogenetic micro-organisms are antigens. After they have invaded the human body, they will stimulate the lymph system's B cells to produce antibodies. The antibody can neutralize the pathogenetic action of the antigen and allow man to acquire a certain ability to defend against certain infectious diseases. The antibody is a group of immunoglobulins of specific functions; they are divided into alpha, beta and gamma globulins, of which gamma globulin contains the highest amount of antibodies, and exist mainly in the blood and the body fluids of the human body. For this reason, when we inject the gamma globulin extracted from the serum of a pregnant woman's placenta into the body of another person, the number of antibodies in that person's body will increase and his ability to resist the invasion of pathogenetic germs will be stronger. Professor Zhu Futang told the reporters that at present the scope of application of placental globulin is mainly for hepatitis A, measles, and congenital immunodeficiency. It is also somewhat effective in emergency treatment of critical stage chickenpox and severe bacterial infections. In daily living, we often see people abusive the use of placental globulin in any old way, for tonsillitis, pneumonia, or even osteomalacia, which has nothing whatever to do with it. There are also some people who treat it as a "nutritional drug," saying that it "has hundreds of benefits and not a single harmful effect." They take it once a week, continuously. With this situation in mind, Professor Zhu emphasized: "Placental globulin provides passive immunity and has only limited applications. For example, it may prevent hepatitis but it cannot cure hepatitis. It has an obvious effect against hepatitis A, but it has no action on hepatitis B. To say that placental globulin can cure hundreds of diseases is totally without scientific basis. To use it blindly is first of all a serious waste, creating an artificial shortage of the drug and causing it not to be available for those who really need it. At the same time, it also affects the health of the user, because repeated use may cause hypersensitive reactions, including nettle rash [urticaria], laryngeal edema, etc. In severe cases, allergic shock may even occur.

Professor Zhu Futang then introduced in detail the method of using placental globulin and the important items to be taken into consideration, based upon his own experience of many years of medical practice. He said that the immune period of placental globulin lasts about 4 to 8 weeks. When it is used to prevent hepatitis and measles, one injection is generally sufficient, and if there is no continuous contact with patients, no more is needed. If there is continuous contact with patients, one more injection may be administered a month later. If this drug is injected into a pregnant woman with O-type blood, it may induce hemolysis in the newborn; extreme caution therefore is necessary. Babies less than 1 year of age are in an important period of gamme globulin synthesis within the body; repeated use of the drug may suppress the production of the body's own gamma globulin. Unless it is absolutely necessary, therefore, it is best not to inject the drug.

In conclusion, Professor Zhu also suggested that the biological product departments must be very strict in producing the drug. There should be a physical examination of the pregnant woman [whose placenta is used to produce the drug], including her history of illness, so as to prevent the use of placenta containing other pathogens in the manufacture of the drug, as this could damage the health of the people.

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9698
CSO: 4008

AUTHOR: WANG Xingyeh [3769 5281 2814]

ORG: Npne

TITLE: "Heat Insulation and Aviation"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 10, Oct 80 pp 15-16

ABSTRACT: A modern aircraft is subject to many undesirable heat sources which include: aerodynamic heating, heat radiation and conduction from engines, heat generation from electric and electronic equipment, and heat dissipated through high temperature air pipes from the compressor. In order to maintain normal temperature in the flight cabin and to protect critical compoenets and equipment from overheating, insulation materials must be installed at key locations on the aircraft. Due to the wide range of applications, a variety of heat insulation materials are being used; they include: polyurethene foam, silicon or silicate compounds, composite metallic foil and fiberglas materials, inorganic fibers such as quartz fiber, ceramic fiber, etc. Overheating is an even more critical problem in the operation of the Space Shuttle, and scientists are currently engaged in intensive research to develop more effective heat insulation materials.

AUTHOR: CUI Changqi [1508 7022 3823]

ORG: None

TITLE: "Air Defense Command System"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 10, Oct 80 pp 22-23

ABSTRACT: To meet the demands of modern warfare involving ballistic missiles and nuclear weapons, it is essential that the operations of command, control, intelligence and communication of an air defense system be automated. Such a system may be established either on a national basis or on a regional basis. In this article, the capabilities of an automated command and control system are introduced and the functions of each subsystem are described in detail. The subsystems include: 1) automatic recording subsystem for recording radar information; 2) data processing subsystem for analyzing and presenting important information to the combat commander; 3) terminal display subsystem; and 4) data communication network.

3012
CSO: 4009

Oceanology

AUTHOR: ZHANG Binggen [1728 3521 2704]

ORG: Mathematics Department

TITLE: "On the Oscillation of the Solutions for Second-Order Functional Differential Equations"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 1, 15 Mar 80 pp 1-8

TEXT OF ENGLISH ABSTRACT: In this paper we consider oscillation and nonoscillation of the solutions for the more general second-order functional differential equations. Some sufficient conditions which keep all the solutions oscillating were obtained.

Here is an example of an equation:

$$y''(t) + f(t), y(t), y(g(t)), y'(t), y'(h(t)) = 0, \; t \geq A \geq 0 \qquad (5)$$

where $g(t) \to \infty$, $h(t) \to \infty$ as $t \to \infty$.

Theorem 1. In addition to the conditions on the continuity and existence and uniqueness of the solution, we suppose that the following conditions are also satisfied:

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 1, 15 Mar 80 pp 1-8]

(i) $f(t, u, v, w, z)$ have the same sign as u, v, if u, v have the same sign;

(ii) for every positive monotonu nondecreasing function or negative nonincreasing function, the following equation $\int^{\infty} f(t, y(t), y(g(t)), y'(h(t)))dt = \infty \cdot \operatorname{sgn} y$ is correct. Then all the solutions of equation (5) oscillate.

The theorems contain partial results of the articles by Kung and Chiou. The necessary and sufficient conditions in which equation (5) has a nonoscillatory bounded solution are established in this paper. This is theorem 3.

In the present paper we prove five theorems which contain some results of foreign articles.

AUTHOR: CHEN Zongyong [7115 1350 6978]
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ORG: CHEN of Shandong College of Oceanology; TANG of Unit No 57653, PLA

TITLE: "On the Determination of Elevation Datum"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 1, 15 Mar 80 pp 15-25

TEXT OF ENGLISH ABSTRACT: The purpose of this paper is to deal with the principle and method of computing mean sea level so as to determine the reference plane (elevation datum) for the local geodetic leveling in China. With the sea level records for 19 years running at a given tide gauge station treated as time series, the mean sea level has been computed by the straight average of 24-hour observations every day and by X, Z, N, G filters. The analysis of the results shows that the accuracy of computation may attain 1 mm, which basically meets the requirement for the local geodetic leveling.

AUTHOR: WANG Huatong [3769 0553 2717]
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et al

ORG: All of the Department of Physical Oceanology

TITLE: "Numerical Modeling of the Circulation and Pollutant Dispersion in Jiaozhou Bay. I. Numerical Computation of Tidal Currents"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 1, 15 Mar 80 pp 26-55

TEXT OF ENGLISH ABSTRACT: This paper deals with numerical computation of the tidal currents in Jiaozhou Bay, the first part of a numerical study of both the circulation and the pollutant dispersion there. A two-dimensional nonlinear model is used. Only two tidal constituents, M_2 and S_2, are being taken into account, their oscillation at the bay mouth taken as input data for computation. The time-step of 60 seconds and the grid-step of 500 m are reasonably chosen. The computation is carried out on an IRIS-60 computer. The comparison between simulation and field observation exhibits excellent agreement, suggesting that the model employed here is satisfactory enough to serve our purposes. From the computations we can come to the following conclusions:

1. In the residual current field of the bay, there exist nine gyres and a "semi-gyre," six of them, including the "semi-gyre," being cyclonic, and the other four anticyclonic. Only three gyres and the "semi-gyre" are remarkable.

The maximum speed of the residual current, occurring at the north end of the bay mouth, is about 21 cm/sec.

2. The tidal currents orientate outgoing directions throughout the bay during ebb, while during flood they behave in a more complicated way due to the existence of gyres. During the period of tide change, tidal currents exhibit a pattern of "∞" or "8" in the entrance part and near the boundaries, while in the open area they show a simple counterclockwise or clockwise rotation pattern.

The maximum speed of flooding currents, occurring at the north end of the bay mouth, is 120 cm/sec, and the maximum speed of ebbing currents, appearing west of Tuandao, 77 cm/sec.

3. The cotidal chart indicates that only seven minutes after the occurrence of high water at the bay mouth it takes place in the west shallow water area. From

the corange lines it can be concluded that the maximum tidal range, 23 cm higher than the tidal range at the bay mouth, occurs at the northeast end of the bay.

4. The numerical computations suggest that the nonlinear terms seem to be of less importance to the change in tidal level of Jiaozhou Bay. Nevertheless, the nonlinear equations should be used because nonlinear terms have a great influence on the residual currents which are of significance to our study.

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SHI Zhili [0670 5268 7787]
SUN Bingyi [1327 4426 0001]
et al

ORG: All of the Department of Marine Chemistry

TITLE: "The Chemical Forms of Zinc and Its Distribution in the Northeast Jiaozhou Bay"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 1, 15 Mar 80 pp 64-78

TEXT OF ENGLISH ABSTRACT: The chemical forms of zinc and its distribution in the surface water of northeast Jiaozhou Bay (25 stations) have been studied. The ASV method and spectrophotometry with dithizone extraction were employed in untreated and treated seawater to identify forms of zinc in the seawater. We suggest that zinc in seawater can be divided into five forms by the following ways:

Particulate zinc (Zn_P). One liter seawater was filtrated through a membrane filter. The remains on the filter were digested in a mixture of HNO_3 and $HClO_4$, and then the content of particulate zinc was obtained by ASV.

Zn_{ASV} (labile zinc plus ionic zinc). They were determined by the ASV method

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 1, 15 Mar 80 pp 64-78]

directly.

Zn_{H2Dz} represents weak bound zinc (Zn_W) plus Zn_{ASV}. It was obtained by spectrophotometry with dithizone extraction directly.

Zn_{ASV} plus Zn_W and bound zinc (Zn_B) is the total soluble zinc (Zn_{TS}). The water sample was digested with HNO_3 and heated until boiling, and the Zn_{TS} was obtained by spectrophotometry.

$$Zn_W = Zn_{H2Dz} - Zn_{ASV}$$
$$Zn_B = Zn_{TS} - Zn_{H2Dz}$$
$$\Sigma Zn = Zn_{TS} + Zn_P$$

Results show high values near the coast area. The ΣZn mean value is 20.7 μg/L (6.9 - 39.6 μg/L); Zn_P 2.70 μg/L (0.4 - 6.5 μg/L), $Zn_P/\Sigma Zn = 13.0\%$; Zn_{ASV} 4.13 μg/L (1.7 - 9.6 μg/L), $Zn_{ASV}/\Sigma Zn = 20.0\%$; Zn_W 5.49 μg/L (1.3 - 19.6 μg/L), $Zn_W/\Sigma Zn = 26.5\%$; $Zn_B = 8.42$ μg/L (1.47 - 20.3 μg/L), $Zn_B/\Sigma Zn = 40.7\%$; Zn_{TS} 18.0 μg/L (5.3 - 34.5 μg/L), $Zn_{TS}/\Sigma Zn = 87.0\%$. The results show that bound zinc is the main form of zinc in the water of northeast Jiaozhou Bay, its content being about half of the total soluble zine ($Zn_B/Zn_{TS} = 46.7\%$), which agrees with Fukai's results.

AUTHOR: SUN Bingyi [1327 4426 0001]
SHI Zhili [0670 5268 7787]
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ORG: All of the Department of Marine Chemistry

TITLE: "The Chemical Forms and Distribution of Lead in the Northeast Jiaozhou Bay"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 1, 15 Mar 80 pp 79-89

TEXT OF ENGLISH ABSTRACT: The chemical forms and distribution of lead in the surface water of northeast Jiaozhou Bay (24 stations) have been studied. The ASV method was employed to estimate the chemical forms of lead in both untreated and treated seawater. The lead can be divided into five forms which were Pb_{ASV} (labile lead plus ionic lead), weakly bound lead (Pb_{WB}), bound lead (Pb_B), particulate lead (Pb_P), total soluble lead (Pb_{TS}) and total lead ($\Sigma Pb = Pb_{TS} + Pb_P$).

The results showed high values near coastal areas. The mean ΣPb was 4.0 μg/L (2.0 - 6.7 μg/L); Pb_P 1.2 μg/L (0.4 - 2.7 μg/L), $Pb_P/\Sigma Pb$ = 30%;

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 1, 15 Mar 80 pp 79-89]

Pb_{ASV} 0.37 μg/L (0.19 - 0.80 μg/L), $Pb_{ASV}/\Sigma Pb$ = 9%; Pb_{WB} 1.1 μg/L (0.23 - 2.70 μg/L), $Pb_{WB}/\Sigma Pb$ = 26%; Pb_B 1.4 μg/L (0.4 - 3.8 μg/L), $Pb_B/\Sigma Pb$ = 35%. The data indicated that Pb_B and Pb_P were the main forms in the seawater. The relationships between some forms of lead and values of Cl% (PH, COD) are discussed also.

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ORG: Department of Aquatic Products

TITLE: "A Preliminary Observation on the Reversal of Sides of Cleisthenes herzensteini (Schmidt)"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 1, 15 Mar 80 pp 90-94

TEXT OF ENGLISH ABSTRACT: In March, 1979, a side-reversed Cleisthenes herzenteini was captured from Shidao fishing grounds of the Yellow Sea. It is a three-year female, measuring 18.3 cm. Its eyes are deviated to the left side, and the color of this side of the body is yellowish brown while the other side is white.

The main features of the fish, such as the indicators of the countable characteristics and the proportional measurements of every part of the body, and the optic chiasma, are all the same as those of the normal ones. Because of the reversal of eyes and the changing of living sides of the body, the shape of the mouth and the morphology of the pectoral fins and scales are also reversed.

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 1, 15 Mar 80 pp 90-94]

The position of the alimentary system in the body cavity is different from that of other flounders, the liver located on the right side of the body and the stomach and intestine deflected to the left side.

9717
CSO: 4009

Shipbuilding

AUTHOR: Xu Ming [3375 2494]

ORG: None

TITLE: "Hunters of the Sea: Submarine Chasers"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 5, 20 Aug 80 pp 2-3

ABSTRACT: Submarine chasers are light antisubmarine craft which work in near-ocean areas (within 200 mn). They range in displacement from 100 to 900 tons and have speeds of 18-35 knots (up to 60 knots for hydrofoils). Their weapons generally include antisubmarine missiles, antisubmarine torpedos, automatic cannon and depth charges; they use radar, sonar and radio equipment. A Soviet Grisha class sub chaser, a US 120-ton aluminum alloy hydrofoil sub chaser and a Canadian 235-ton sub chaser are briefly described. The general characteristics of such boats are: small size and high maneuverability, powerful antisubmarine capabilities, and multitask capabilities (patrol, observation, communications and the like). Future developments are likely to include: use of small towed variable-depth sonar equipment instead of ship-mounted units; increasing use of hydrofoils, surface-effect craft (such as the British VT-2), and helicopters (such as on the US "PHM" project); and use of rocket-assisted self-guiding antisubmarine torpedos, which will increase range and rapidity of response. An example is the US ASROC system.

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ORG: None

TITLE: "A Brief Description of Hull Construction"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 5, 20 Aug 80 pp 4-6

ABSTRACT: The ship hull assembly process consists of the following stages: (1) assembly of machined parts into assemblies, (2) combining of parts and assemblies into subsections and full sections, and (3) assembly of subsections or full sections into the complete hull. The details of assembly of the various subsections (bottom, sides, deck and compartments) are described, starting with plates which are shaped and the positions of strengthening ribs and cross members marked on them, and followed by installation of these members and of interior plating. Assembly of the entire ship from the subsections and sections can be done as follows: (1) simple joining of completed sections; (2) the "tower" method, in which assembly begins with a bottom section slightly aft of amidships and continues upwards and toward the two ends; (3) the "island" method, in which several sections of a ship are built by the "tower" method in the building slip and ultimately joined; and (4) the mixed assembly method, in which utilisation of building slip area is improved by building one section of the subsequent ship while the first ship is being built, then sliding this section down after the first ship is launched and adding the other sections of that ship, at the same time beginning work on a section of the next ship.

AUTHORS: BI Shiguan [3968 1102 0385], GUO Chong [6751 0339], TANG Zhongfan [0781 6988 5672]

ORG: None

TITLE: "Antiship Guided Missiles Past and Present"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 5, 20 Aug 80 pp 7-9

ABSTRACT: After the Second World War, the United States relied primarily on carrier aviation for its antiship capability, while the Soviet Union developed antiship missiles. The sinking of the destroyer Eilat by a Styx missile in 1967 awakened the US and its allies to the importance of antiship missiles, and development programs began. Not only the US, but France, West Germany, Italy and Israel developed such missiles, although the Soviet Union is far ahead in variety and number deployed. Short range missiles (4-40 km) include the Soviet SS-N-2, SS-N-7 and SS-N-11, the French MM-38 and AM-38, and some West German and Italian models. Their range is so short that they expose the launching ship to enemy action. Medium range missiles (60-200 km) include the Soviet SS-N-9, the French MM-40, a joint French-Italian missile and the US Harpoon. These have a striking capability beyond the line of sight. Long-range missiles (over 500 km) include the Soviet SS-N-3 and SS-N-12 and the US Tomahawk. These have effective ranges of up to 1,000 km. Midcourse guidance may be by aircraft or satellite. The characteristics of newer missiles include: multiplicity of uses, high accuracy and explosive power, good penetration capability and high maneuverability. The characteristics of the SS-N-2, the MM-38 and the Harpoon are given in a table.

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TITLE: "A New Weapon of the Future: The Particle Beam Weapon"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 5, 20 Aug 80 pp 12-14

ABSTRACT: The US and the Soviet Union are pursuing development of particle beam weapons, which direct a high energy beam of protons, electrons or neutrons against a target. In addition to scientific uses, these devices can be employed in antimissile and antisatellite systems. The CEP of Soviet missiles is expected to decrease to 46 m by 1990, giving a 20 megaton warhead a kill probability of 97 percent; 100 warheads could be put on each missile, so that 300 Soviet missiles could wipe out 900 US missiles even if each had 23 concealed firing positions. Hence the importance of new, powerful ballistic missile defense weapons. Currently the US Navy is actively pursuing development of a particle beam system which might weigh 100 tons, develop pulses at 500 MV with currents of 10 kA, with pulse width of 10 ns, and have a killing range of between 4.5 and 9.5 km. The journal AVIATION WEEK reported in October 1979 that the Soviets had made a major breakthrough, using a beam to destroy a ground-based military target, and presented some pieces of evidence that major Soviet scientists were working on the program. A particle beam program has four major aspects: production and acceleration of the beam; the

[continuation of JIANCHUAN ZHISHI No 5, 80 pp 12-14]

power supply system; propagation of the beam through the atmosphere; and the kill mechanism. The beams are subject to attenuation by the atmosphere and distortion by the earth's magnetic field. The technology may be considered to be still in its early stages. Submarine-based ICBM's are likely to be the main strategic weapon in the 21st century.

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ORG: None

TITLE: "Lateral Propulsion Units"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 5, 20 Aug 80 pp 28-29

ABSTRACT: Because the rudder technique of turning is ineffective in a short radius, small river ships may take several minutes to turn around, while it may take a large tanker as much as an hour. Maneuverability can be greatly increased by the use of lateral propulsion units installed in cylindrical passages through the hull of a ship. The propulsion unit may be of the jet type, screw type or straight-vane propeller type. Other units, mounted on vertical shafts, protrude below the bottom of the ship and may be turned in any desired direction. These highly maneuverable units are important in dynamic ship positioning, which is used in such activities as seabed mining and offshore well drilling. In this system, positioning signals from satellites or radio networks are received by the ship and interpreted by onboard computers which give automatic position correction directions to the small maneuvering engines under the hull of the ship.

END

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

SHANGHAI RESEARCH INSTITUTES REFORM MANAGEMENT SYSTEMS

Beijing GUANGMING RIBAO in Chinese 26 Sep 80 p 1

[Article by Correspondent Xie Junbao [6200 6511 1032]: "Reform Management Systems for Promotion of the Development of Research. Ten Shanghai Research Institutes Achieve Outstanding Results Through Broadened Autonomy"]

[Text] Since last year, a total of 10 institutes in Shanghai, including five regional institutes and five institutes under academies of central government departments have had broader autonomy over methods of economic management such as planning, finances, employee awards, and solicitation of employment applications, as well as the institution of a joint system of research. Within a single year's time, outstanding results have been received.

Fulfillment of scientific research tasks has been promoted. According to statistics from the five regional institutes given increased autonomy, last year's accomplishments on 103 research items exceeded original plans by 15.7 percent, for an increase of 90.7 percent over 1979. During the first half of this year, there was a further increase of 54.8 percent over last year.

Management of scientific research and economic accounting have been enhanced. Following the broadening of autonomy, these test units all strengthened their management over scientific research, established and perfected research discipline, and instituted systems of budgeting for research problems, final accountings, and research problem cost accounting. In the case of the Shanghai Materials Institute, an accounting card was used for each issuance of research funds for problems. Scientists and technicians used these cards to keep their books, and no matter whether expenditures were for materials, for processing, or in connection with experiments, all were written down as part of cost accounting. This effectively changed the situation in which currency had been spent casually and materials requested at will without regard for economic effectiveness.

Income has vastly increased from research and production. According to statistics from the five test site institutes, increased income from research and production last year amounted to 6.52 million yuan, a 72.8 percent increase over 1978. During the first half of this year, there was another increase of 31 percent over last year. The Shanghai Machine Manufacturing Technology Institute and the Shanghai Organic Florine Materials Institute had an income last year that was greater than expenditures. Not only did they require no public funds, but they paid profits to higher authorities.

Further arousal of the enthusiasm of researchers. As a result of the expansion in autonomy and the institution of apportionment of increases in income, the institutes have funds for the development of their own research, for their collective welfare, and for awards to employees. All of these units have instituted a system of awards for employees. Some institutes have allocated some of their collective welfare funds for the construction of dwellings for their employees, and these have enhanced the morale of the scientists and technicians.

On 25 September, the Shanghai Municipal Science Commission convened a citywide conference of leading scientific and technical cadres to summarize the experiences of these units and to call upon other research units to undertake reforms in a planned and measured way, continuing the widening of autonomy and the system of reforms in the management of research.

9432
CSO: 4008

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

GUANGDONG GIVES FIRST MATERIAL REWARDS FOR SCIENTIFIC ACHIEVEMENT

Guangzhou NANFANG RIBAO in Chinese 21 Sep 80 p 1

[Article: "Guangdong Province Institutes Material Rewards Throughout the Province for the First Time for Scientific and Technical Achievements. Provincial Science Commission Yesterday Convened an Awards Issuance Meeting of the General Membership to Issue Awards for "Guichao" Superior Rice Variety and for 147 Outstanding Scientific and Technical Achievements, and to Commend Three Units Including the Provincial Testing and Analysis Institute as Advanced Research Units"]

[Text] The Provincial Science and Technology Commission yesterday convened a province-wide meeting of the general membership in the Guangdong Hall of Science for the issuance of awards for scientific and technical achievements. Awards were made for 147 outstanding scientific and technical achievements during 1978 and 1979, and to three advanced research units. The 325 units that participated in this research received certificates of honor, and 867 scientists and technicians received certificates of accomplishment and reward money. This marks the first time that province-wide material rewards have been made for scientific and technical accomplishments.

Since the All-China Science Congress, the broad masses of scientists and technicians in Guangdong Province have liberated their thoughts and applied their wisdom and creativeness to contribute to four modernizations construction so that large numbers of accomplishments in science and technology have emerged, and the quality of scientific research has improved markedly. The categories for which rewards were made on this occasion were all of advanced levels for the province for which results in application were quite good. Following recommendations from various departments in each prefecture, municipality and the province, plus appraisal by others in the same lines of work, the Provincial Science Commission approved issuance of the rewards. Of the total number, 25 were in the field of agriculture, 102 in industry, and 20 in medicine and health. Ninety-five percent resulted from applied research, and some have shown remarkable economic benefits. China was first to pioneer some of these achievements, or hold a leading position in them. First prize went to Huang Yaoxiang [7806 5069 4382] and colleagues at the Provincial Agricultural Academy's Paddy Rice Institute for the breeding of a new rice variety, "Guichao." This is a new variety that produces abundant yields and is best for use as either an early or late crop variety, which has been brad in Guangdong Province since the 1960's. Currently the area to which its cultivation has spread amounts to one-third the total cultivated rice area in the entire province. Eleven second class awards went to the following: the Silk Industry

Institute of the Provincial Agricultural Academy for its erhuaxing [0059 0553 1840] variety of silkworm, "Guangnong No 5"; the Provincial Insect Institute's taxonomical research on lijingui [7787 6855 7898]; the Provincial Marine Transportation Institute, the Shanghai Boat Institute of the Communication's Department, the Wenchong Boatyard, and the Huanan Engineering Academy's shipbuilding department for their hinged blade [7070 0430] ship propeller; the Guangzhou Alloy Steel Plant for its tungsten 12 aluminum high-speed aluminum casting cutting tool; the Guangzhou No 3 Rolling Mill and the Guangzhou Municipal Alloy Institute for their inductor fixed type industrial frequency heat-hardened machine tools; the Guangzhou Ferrous Metals Research Institute of the Metallurgy Department, the Shaoguan Smelting Plant, the Provincial Metallurgy Design Institute, and the Mabo Smelting Plant for their flue gas dianluo hefa chugong [4290 4820 0678 3127 7110 3074]; the Huanan Engineering Academy for its ferrite inductive loading (method); the Shaoguan Prefectural Industrial Institute, the Shaoguan Instrument Plant, and the Shaoguan Gear Plant for their large aperture raster numerical display device, and their raster numerical controlled precision forging machine; the Provincial Cardiovascular Diseases Institute, and the Cardiovascular Care Department of the Provincial People's Hospital, the Guangzhou Ferrous Metals Research Institute, the Zhongshan University's Biology Department, the Guangzhou Municipal No 1 Knitting Mill, the No 22 Plastics Plant, the Meat Processing Plant, the I-type Biological Heart Valve from the No 7 Knitting Plant, the Liwan District People's Hospital in Guangzhou, the Shantou Sensitometer Plant, the Guangzhou Photographic Chemicals Plant's Rapid X-Ray Kinescopes in Fully Lighted Room; and the new method of torsiocalculations of the Guangzhou Marine Navigation Bureau's Science Institute. Forty-five items were awarded third class awards, and 90 received fourth class awards. Cash awards of 2000 yuan, 1500 yuan, 1000 yuan, and 500 yuan respectively were given for accomplishments in each of the four classes of awards. The Guangdong Provincial Testing and Analysis Institute, the Guangzhou Municipal Pharmaceutical Industry Institute, and the Shaoguan Prefecture Industrial Institute, who had many accomplishments, were designated advanced units, and each received 5000 yuan worth of research materials as awards.

Attending yesterday's awards meeting were famous scientists Pu Zhelong [5543 5832 7893], Pang Xiongfei [1663 7160 7378], and Lin Ping [2651 1627], as well as more than 800 people from everywhere, including the Municipal Science Commission and officers in charge in provincial departments concerned. Deputy Province Chief and Provincial Science Commission Director Ye Xuanping [5509 6693 1627] spoke at the meeting, giving high praise to the arduous work of scientists and technicians throughout the province, and stressing the need for good management of the scientific and technical accomplishments so that these accomplishments will be spread widely and rapidly and be put to use. The Provincial Science Commission also announced at the meeting that henceforth scientific and technical accomplishments for the entire province will be evaluated once annually and awards made. Accomplishments for 1980 should be reported to the Provincial Science Committee before the end of February next year.

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AUTHOR: LIN Yongchang [2651 3057 2490]
LU Weiqiang [4151 4850 1730]

ORG: None

TITLE: "Wide Band Anti-Reflection Coating with Variable Index Layers"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, Jun 80 pp 10-21

TEXT OF ENGLISH ABSTRACT: This paper, starting from the recent theory of thin film optics and the method of optimization, first comes to several conclusions regarding multilayer anti-reflection coating design. Based on these conclusions, the performance of the anti-reflection coating with variable index layers is discussed; the monochromatic effects of the variable index layers, the calculating method, the influence of the distribution of index profile on the spectral performance of the anti-reflection coating, and the compensation and utilization of the spectral effects of the variable index are also studied. This paper also introduces a method for the design and preparation of an anti-reflection coating with little color and low reflectance in the visible region, and new technologies, such as integral control, are also presented.

AUTHOR: HUANG Haochuan [7806 3185 1557]

ORG: None

TITLE: "A Study on the Crystal Growth and the Thermal Stability of CMC Lead Azide"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, Jun 80 pp 22-31

TEXT OF ENGLISH ABSTRACT: This paper reports a study on the crystal growth, particle size and crystal form of CMC lead azide by the scanning electron microscope and on the thermal stability of CMC lead azide determined by DTA and TGA. A brief description of the control mechanism of the crystal control agent is given in this paper. The spheroidization of the crystals depends on the presence of the active agents and the tartrates. The sphericized crystals present better thermal stability.

AUTHOR: LI Huichang [2621 1920 2490]
YANG Jinyao [2799 6855 5069]
QI Rongchang [4359 2837 7022]

ORG: None

TITLE: "Hollow Projectile Study"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, Jun 80 pp 32-41

TEXT OF ENGLISH ABSTRACT: The hollow projectile is virtually a thin-walled tube, also known as the tube projectile. It is characterized by its light weight, high muzzle velocity and desired aerodynamic behavior. Hence it provides the advantages of lower impulse, straighter trajectory, smaller dispersion and excellent penetrating power.

Based on the past work of some other authors and integrated with the recent experimental results obtained by the authors themselves, this paper deals with the hollow projectile in a more detailed way. Here its drag characteristics, accuracy of dispersion and penetrating power are fully described; its gyroscopic stability theoretically compared with that of the solid projectile; the approximation method for estimating its drag characteristics developed; and, in the conclusion, the authors' opinions and recommendations concerning the military application potentialities of this new kind of projectile are presented.

AUTHOR: WANG Yuanyou [3769 0337 2589]
WANG Xinhua [3769 2450 5478]

ORG: None

TITLE: "Burning Mechanism of the End-Burning Propellant Grain Embedding Metal Fibers"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, Jun 80 pp 42-53

TEXT OF ENGLISH ABSTRACT: One of the effective methods for increasing the thrust of the rocket motor with end-burning grain is to embed metal fibers along the longitudinal direction in the propellant grain.

The purpose of this paper is to clarify the burning mechanism of this end-burning grain so as to provide a theoretic basis for designing this type of grain. In this paper the factors influencing the burning rate along the fibers are detailed and some experimental results are presented.

Experimental studies have indicated that the burning rate along the fibers can be greatly increased and different values of the burning rate can be obtained by embedding fibers of different metals. Therefore, the thrust of the rocket motor with end-burning grain can be controlled and modulated by means of using different metal fibers.

9717
CSO: 4009

AUTHOR: LO Zhenhua [5012 2182 5478]

ORG: South China Engineering College

TITLE: "High Strength Cement Made from Gangue"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 5, Oct 80 pp 1-5

ABSTRACT: This article introduces an experiment that successfully utilizes low calorific gangue for the making of high strength cement in common vertical kilns. The process involves the use of a low calorific fuel mixture of gangue and low calorific bituminous coal, the replacement of clay with gangue as the siliceous material, the burning in common vertical kilns at a lower temperature of 1250-1350°C, the mixing with appropriate amount of high temperature calcined gypsum, and such mixing materials as slags, etc., and finally, the grinding. The grog contains also fluoroaluminates and sulfur aluminates in minerals, besides silicate-containing minerals.

AUTHOR: HO Shichun [0149 0013 2504]

ORG: Jiangyou Cement Plant

TITLE: "On the Combined Utilization of Heat Energy in Our Plant's Rotary Kilns"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 5, Oct 80 pp 6-8

ABSTRACT: The author discusses the various aspects of how heat energy in the three rotary kilns of the Jiangyou Cement Plant may best be economized and better utilized by lowering the moisture of the feeds, reducing the loss of thermal radaition over the kiln surfaces, and adoption of double medium fluid vibration cooler to replace the existing multipass coolers. In addition, methods to recover and utilize heat radiation loss from the head, body and tail of the kilns are also suggested.

AUTHORS: WANG Kaiguo [3769 7030 0948]
LU Qingquan [7120 1987 2938]

ORG: WANG of Jiangsu Province Construction Materials Bureau, and LU of Taichang Construction Materials Plant

TITLE: "Modification of Semi-mechanized Vertical Kiln into Biroller Mechanized Vertical Kiln"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 5, Oct 80 pp 36-37

ABSTRACT: This article introduces the method, technical information and specifications of how semi-mechanized vertical kiln of the Taichang Cement Plant was converted into bi-roller mechanized vertical kiln that raised cement product from 26,000 tons in 1976 to 44,360 tons in 1979, and against marked decrease in fuel and grog consumption. The modification is also recommended in view of its low cost, shorter time required, and simpler processing of the modification.

AUTHOR: LIU Hongsheng [0491 1347 0524]

ORG: Hubei Province Dawu County Cement Plant

TITLE: "Simple Self-made Silicon Controlled Electromagnetic Vibration Feeder"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 5, Oct 80 pp 51-52

ABSTRACT: This article introuces the construction, circuit, performance and characteristics of a 100 watt silicon controlled electromagnetic vibration feeder, that can feed continuously at a rate of 0-8 tons per hour. The feeder was developed by the Dawu Cement Plant, and has proved to be simple, reliable and convenient.

11,206
CSO: 4009

AUTHOR: None

ORG: Laser Holography Group, Chinese Precision Engineering Institute for Aircraft Industry

TITLE: "Laser Holography Used for Nondestructive Testing of Honeycomb-Sandwich Panels and Laminated Structures"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 1-8

TEXT OF ENGLISH ABSTRACT: This paper illustrates the principle of laser holography and its application to nondestructive testing of adhesive-bonded aluminum honeycomb-sandwich panels. The testing equipment, methods, and results, as well as defects analysis, are described. Also, it shows a set of photographs of holographic interferometric analysis and that of real sampled defects for comparison, and gives some further suggestions regarding laser holography used for NDT.

AUTHOR: None

ORG: AE Group, Physics Teaching and Research Section, Beijing Institute of Aeronautics and Astronautics

TITLE: "Acoustic Emission Transducers and Their Calibration (II)"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 9-14

TEXT OF ENGLISH ABSTRACT: This paper describes the development of acoustic emission transducers. In addition to the piezoelectric transducer, the capacitive transducer and the optically sensed AE detecting apparatus, the related calibration methods are mainly discussed. The technique for checking the change in response with temperature for the piezoelectric transducer is presented.

AUTHOR: XU Yian [1776 5030 1344]

ORG: Gansu Automotive Gears Factory

TITLE: "Heat Treatment Quality Control of Steel Parts--Introduction of the Automatic Nondestructive Tester Type GC-1"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 15-19

TEXT OF ENGLISH ABSTRACT: The paper describes the operating procedure and test results of the automatic nondestructive tester Type GC-1 applied to sorting steels and determining the depth of hardening case, hardness of skin and core area, as well as structure of the core area of various kinds of hardened steel parts.

AUTHOR: LIU Liben [0491 4409 2609]
LEI Kaifu [7191 7030 4395]

ORG: Both of the Electric Power Laboratory, Hubei

TITLE: "Crack Detection of Butt Welds in Tubes with TIG Arc Welded Root by the Magnetic Particle Method"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 20-23

TEXT OF ENGLISH ABSTRACT: The inspection of butt welds in tubes with TIG arc welded root by magnetic particle method and its test results are described. The parameters of the self-made detector are given.

AUTHOR: DING Guantang [0002 1351 1016]

ORG: None

TITLE: "Detection of Fatigue Cracks in Turbine Blades by Eddy-Current Testing Method"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 24-25

TEXT OF ENGLISH ABSTRACT: The main purpose of this paper is to describe the operating method of the eddy-current detector Type 7505 used to find cracks or other defects in turbine blades. The detector has been successfully used to inspect the leading and trailing edges or the tenon grooves of more than 3000 turbine blades for cracks. Results show that it has some advantages over the optical magnifier and penetrant inspection method as it can be used not only to find surface cracks but also to find out subsurface cracks without disassembling blades from rotors.

AUTHOR: XIA Jizhen [1115 4764 4176]
CHEN Wenlin [7115 2429 7207]

ORG: None

TITLE: "Assessing Grain Size of Die Forging by Ultrasonic Attenuation Method"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 26-28

TEXT OF ENGLISH ABSTRACT: By means of measuring the ultrasonic attenuation property, it is easy to determine whether the steel forgings have coarse grains. The grain size of a forging can be estimated by comparing the value of the amplitude of the first echo with that of the second one. It is considered that the method can be applied to the forging inspection in production.

AUTHOR: JIN Shilin [6855 2514 7792]

ORG: Baoji Welded Pipe Plant

TITLE: "Industrial TV Apparatus for the Inspection of Inside Surfaces of Welds in Pipes"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 29-31

TEXT OF ENGLISH ABSTRACT: This paper introduces a trolley with TV apparatus for the inspection of inside surfaces of spiral welds in pipes, and describes the design and construction of the trolley as well as its operating experience.

AUTHOR: HE Jiawen [0149 1367 2429]
ZHANG Dingquan [1728 1353 6898]

ORG: Both of Xi'an Jiaotong University

TITLE: "Study on the Selection of Diaphragm Angle and the Method of Locating Peak Position for Stress Measurement by X-Ray Diffraction"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 32-40

TEXT OF ENGLISH ABSTRACT: Based on analysis and comparison, it is considered that the diffraction geometries of the parallel-beam method and the focusing method are consistent with each other in X-ray stress measurement. The accuracy of stress measurement can be increased by improving the diffraction intensity. It is suggested that the diaphragm angle should be 1.36°. The experimental results and their variance analysis show that the diaphragm angle influences mainly the value of the stress measurement, while the methods of locating the peak position have appreciable effects on both value and deviation. A proper method of locating the peak position should be chosen in accordance with the profiles of the diffraction lines. Generally, higher accuracy and better adaptability to most types of profiles may be obtained by using the half-height and quarter-height methods in X-ray stress measurement.

AUTHOR: None

ORG: X-Ray Laboratory, Research Department, Northeast Light Alloy Plant

TITLE: "Surface Stress Measurement of Coarse-Grained Aluminum Alloy"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 41-43

TEXT OF ENGLISH ABSTRACT: This paper presents the method of measuring the stress of coarse-grained aluminum alloy when the source of the X-ray or specimen is difficult to oscillate. Each diffraction peak is measured at the oscillation range of $0^\circ \pm 5^\circ$ and $45^\circ \pm 5^\circ$. The difference of incidence angle is 1.25°. The stress value can be calculated by the formula of $0\text{-}45^\circ$ conventional method in which $\Delta(\overline{2\theta})$ is used instead of $\Delta(2\theta)$. Results of mathematical analysis show that the method is feasible.

AUTHOR: None

ORG: Central Research and Testing Department, Hudong Shipyard

TITLE: "Performance and Characteristics of Dye-Penetrant Liquid Type HD"

SOURCE: Shanghai WUSUN JIANCE [NONDESTRUCTIVE TESTING] in Chinese Vol 2 No 4, Aug 80 pp 44-45

TEXT OF ENGLISH ABSTRACT: This article deals with the development of dye penetrant liquid Type HD and some points that should be noted. It describes the work on reducing toxicity and improving sensitivity as well as preparation techniques.

9717
CSO: 4009

AUTHOR: LI Xiang [2621 4382]

ORG: None

TITLE: "The First-Order Theory of Kripke's Semantical Analysis of Non-Classical Logics"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 1-16

TEXT OF ENGLISH ABSTRACT: Let T(K) be the two-sorted first-order theory. The non-logical axioms of T(K) are:

(1) $\Gamma R \Gamma$,

(2) $T R \Delta \wedge \Delta R \Delta' \rightarrow \Gamma R \Delta'$,

(3) $\Gamma \vdash P \wedge \Gamma R \Delta \rightarrow \Delta \vdash P$.

In this paper we first introduce the set F(K) of the formulas of T(K) in which the fact that

$$\forall \alpha(\Gamma) \in F(K),\ \alpha(\Gamma) \leftrightarrow \Lambda\Delta(\Gamma R \Delta \rightarrow \alpha(\Delta)).$$

The principal results of this paper are:

(1) If $\vdash_M \alpha$, then $\vdash_{T(K)} \Gamma \models \alpha$,

[Continuation of HUAZHONG GONGXUEYUAN XUEBAO No 1, Mar 8C pp 1-16]

(2) If $\vdash_{T(K)} \Gamma \models A\alpha\beta$, then $\vdash_{T(K)} \Gamma \models \alpha$ or $\vdash_{T(K)} \Gamma \models \beta$,

(3) If $\vdash_H \alpha$, then $\vdash_{T(K)} (\alpha)^{\Box}$and $\vdash_{T(K)} (\alpha)^{\Diamond}$,

(4) If $\vdash_{S5} (\alpha)^{\Box}$, then $\vdash_{T(K)} (\alpha)^{\Box}$.

where M is the classical logic, H the intuitionistic logic and S5 the Lewis' modal logic S5.

AUTHOR: ZHANG Jinwen [1728 6930 2429]

ORG: Institute of Computing Technology, Chinese Academy of Sciences, Beijing

TITLE: "A Family of Models of Lattice-Valued Sets"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 17-26

TEXT OF ENGLISH ABSTRACT: It is known that D. Scott established the Boolean-valued models $V^{(B)}$ of the set theory, and he pointed out that one might develop also the lattice-valued set field $V^{(G)}$, making the conjecture that these fields $V^{(G)}$ might form a family of models of intuitionistic set theory. In this paper, a family of special lattice G, together with logical connectives and quantifiers that are defined on G, has been chosen and the lattice-valued set fields $V^{(G)}$ developed, subsequently proving that the fields $V^{(G)}$ are not models of the intuitivistic set theory. In other words, some axioms of the intuitivistic logic are false in $V^{(G)}$, while others that are not accepted by the intuitivistic logic are true in $V^{(G)}$. It has also been proved that $V^{(G)}$ are models of Zermelo's set theory based on the other weaker predicate logic W_2L.

AUTHOR: YUE Yujun [2867 3022 0193]
SHI Niandong [0670 1628 2639]

ORG: YUE of Tianjin Teachers Academy; SHI of Xinxiang Teachers Academy

TITLE: "Notes on W_1L Calculus"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 27-32

TEXT OF ENGLISH ABSTRACT: W_1L Calculus has been studied and reported by Zhang. In this paper, the discussion on W_1L Calculus is continued and a new system, W_2L, has been constructed by adding five new axioms to W_1L. It is proved that, of the 99 theorems of Kleene's system, those which are true or effective under Fuzzy Evaluation of strong implication are provable in W_2L, while the others are not.

AUTHOR: YU Yin [0060 1377]

ORG: None

TITLE: "A Study of Uncertain Systems from the Point of View of Set Theory"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 33-43

TEXT OF ENGLISH ABSTRACT: In control problems the uncertain variables are often bounded, thus uncertainty can be spoken of as "sets" and uncertain systems can be studied by the methods of set theory. In this paper, the reachability problems of target set and target tube as well as the estimation problems of the states of uncertain systems have been discussed by the application of the set theory. The ellipsoid algorithm of the proposed problems for the linear uncertain systems has also been obtained.

AUTHOR: ZHANG Zigang [1728 1311 0474]

ORG: None

TITLE: "The Logical Sum of Column Vectors and the Supremum of the Ergodic Exponent of a Stochastic Matrix"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 44-46

TEXT OF ENGLISH ABSTRACT: The first part of this paper deals with the connections between the calculations of the logical sum of column vectors and the transition of probabilities of a homogeneous Markov Chain. In the second part a supremum of the ergodic exponent of a set of S x S ergodic stochastic matrices is given as $T_S = (S - 1)(S - 2) + 1$.

AUTHOR: CHEN Xiaokang [7115 1420 1660]
YANG Minghui [2799 2494 6540]

ORG: Both of the Large Systems Specialty, Department of Automatic Control

TITLE: "On the Supremum $\overline{r}_s$ of the Ergodic Exponent of S x S Ergodic Random Matrix Family"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 47-54

TEXT OF ENGLISH ABSTRACT: It is proved in this paper that the supremum $\overline{r}_s$ of the ergodic exponents of S x S ergodic random matrix family is $r_s = S^2 - 3S + 3$, thus the result of the reference document, $\overline{r}_s \leqslant S^2$, is given an impetus.

For an arbitrary S x S matrix P, we can judge if P is an ergodic matrix by using $\overline{r}_s$. In practice the use of the formula

$$r(P) \leqslant 1S - 1 + 2 - g(1)$$

can further reduce the computing amount in finding the ergodic exponent of matrix P.

AUTHOR: WANG Qin [3769 0530]
CHEN Yingtian [7115 2019 1131]

ORG: None

TITLE: "A Method for Finding the Values of Deflection of Light in the Weak Gravitational Field"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 55-57

TEXT OF ENGLISH ABSTRACT: The light speed formula in the gravitational field as observed in the inertia frame is derived by the use of Einstein's approximate line element. Then, the correct values of deflection of light in the field can be found by the application of Shell's law in wave optics.

AUTHOR: HE Yusheng [0149 4416 3932]

ORG: None

TITLE: "Uni-direction Selection of Frequency"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 58-64

TEXT OF ENGLISH ABSTRACT: According to the reciprocity of antennas and the unity of bidirection propagation paths of electric waves in the ionosphere, and associating the embodiment-separation-tolerance concept with the panbox principle of pan-systems analysis, this paper proposes a new technique for shortwave communication of what is called unidirection selection of frequency. This kind of technique allows adaptive selection and prediction of frequencies by using on-the-spot real determination. Compared with traditional systems, the proposed system is simpler, more economical, reliable and efficient. A number of experiments spanning 3×10^3 km - 9×10^3 km showed that $P_e = 10^{-4}$ for 50 b/s FSK.

AUTHOR: DENG Julong [6772 5112 7893]

ORG: None

TITLE: "A Simplified New Model for the Output Feedback of the Decentralized Control Systems"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 65-81

TEXT OF ENGLISH ABSTRACT: This paper proposes a simplified new model for the output feedback of the decentralized control system which is a combination of the state space approach of modern control theory and the frequency domain approach of classical control theory. This model not only makes it easier to represent system characteristics by using state matrices, but also makes it convenient to design controllers by the transfer function, thus simplifying the design work. As the model contains only a few parameters, it can be applied to systems with unknown parameters without difficulty.

AUTHOR: WANG Feilong [3769 7378 7893]
ZOU Kuizheng [6760 1145 2398]

ORG: None

TITLE: "The Design of Control Software in CNC Systems"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 82-89

TEXT OF ENGLISH ABSTRACT: It is well known that all operations of a machine in a CNC system are controlled by the software, so its design becomes one of the key problems. A CNC system is superior to an NC system because of its flexibility in control software which has much to do with the design of the system as a whole.

The purpose of this article is to describe the design of part of the control software and to present the outline of the whole software.

AUTHOR: GUO Zhirong [6753 5365 2837]

ORG: None

TITLE: "The Mathematical Model of High-Speed Automatic Forging"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 90-105

TEXT OF ENGLISH ABSTRACT: From the basic equations of plastic flow the author advances in this article a complete set of formulas which expound the regularity of the changing dimensions and shapes of a workpiece as well as the movement of the machine unit in the process of automatic forging by means of flat tools so as to provide a mathematical model for computerized control of high-speed automatic forging.

The results in this paper are also applicable to non-automatic control of forging technology.

AUTHOR: REN Yuan [0117 0337]
CHENG Guangbi [4453 0342 1732]
SUN Yangsheng [1327 2254 5116]
ZHANG Yongli [1728 3057 4539]

ORG: None

TITLE: "State Equations of the Generator in the Power System"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 106-118

TEXT OF ENGLISH ABSTRACT: The fifth, fourth and third order state equations of the generator that delivers electrical power over great distances have been obtained by referring to Parker's equation and adopting parameters commonly used in engineering computation. Since in the fifth order state equation only the stator resistance is neglected, the equation is of comparatively high accuracy theoretically. As for the simplified third order state equation, the effect of damping winding on the electromagnetic torque is also considered. Compared with the equation of the same order where the effect of damping winding has been entirely neglected, the derived equation gives a more exact description of the behavior of the actual machine.

AUTHOR: ZENG Guangda [2582 1684 6671]

ORG: None

TITLE: "The Synthetic Methods of Linear Dynamic Systems Via Block-Pulse Functions"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 119-129

TEXT OF ENGLISH ABSTRACT: This paper deals with the basic definition and main properties of block-pulse functions, the synthetic methods of linear dynamic systems via block-pulse function, the derivation of matrix equations of this synthesis and illustrations by examples of their applications.

AUTHOR: CHEN Shiyu [7115 0013 3768]

ORG: None

TITLE: "A Method of Equivalent Source Analysis"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 130-136

TEXT OF ENGLISH ABSTRACT: Based on the basic method of network topology analysis, the use of the theorem of equivalent source for the analysis of the linear network problems is discussed and some simple methods for determining the parameters of the equivalent source are derived. It is convenient to use this method for analyzing the state of a branch in case the parameters of the branch of the complex linear network undergo a change.

AUTHOR: CUI Kun [1508 2492]
HU Zhenhua [5170 6069 5478]
ZHAO Juhua [6392 5468 5478]

ORG: None

TITLE: "Matrix Steel 65Cr4W3Mo2VNb"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 137-150

TEXT OF ENGLISH ABSTRACT: This paper deals with a matrix steel 65Cr4W3Mo2VNb with high strength and toughness. The alloy composition, main properties and heat treatment of this new model of steel which contains niobium are described in some detail. The strength and toughness of this alloy have been improved remarkably by properly increasing carbon content in the composition of quenched matrix of high speed steel and adding 0.2 - 0.3 percent Nb at the same time.

Practice has proved that the new model of steel not only possesses fine metallurgical qualities, good technological properties and high strength and toughness, but also gives different combinations of strength, toughness and wear resistance by adjusting the process of heat treatment. Therefore it is suitable for various kinds of cold heading and extrusion dies, and the life of these dies is more than doubled in comparison with others made of W18Cr4V, Cr12MoV, etc.

AUTHOR: YUN Tianquan [0061 1131 6898]

ORG: None

TITLE: "The Analysis of Axisymmetric Stress in a Solid Revolution by the Integral Equation Method"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 151-158

TEXT OF ENGLISH ABSTRACT: The problems of axisymmetric stress in a solid of revolution can be reduced to two simultaneous Fredholm integral equations of the first kind. An iteration method is discussed. A lemma similar to E. Rakotch's contractive mapping theorem and the convergent proof of the iteration method are given.

AUTHOR: CHU Kunliang [2806 2492 0081]

ORG: None

TITLE: "The Application of Divergence in Energy Principles"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 159-169

TEXT OF ENGLISH ABSTRACT: If body forces are not considered, the work or virtual work is analogous to the flux and the strain energy density or virtual energy density is analogous to the divergence. It follows that the expression of the virtual energy density or complementary virtual energy density can be deduced directly by utilizing a formula for calculating divergence and then the work-energy principle of virtual work and the principle of complementary virtual work are established respectively by utilizing the divergence theorem.

AUTHOR: HUANG Yuying [7806 3768 4134]
JIN Mengshi [6855 1125 4258]
LEI Guopu [7191 0948 3877]

ORG: None

TITLE: "Imperfection Sensitivity of Simply-Supported Cylindrical Panels under Normal Pressure"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 170-179

TEXT OF ENGLISH ABSTRACT: In this paper, a numerical method for computing imperfection sensitivity of simply-supported cylindrical panels under normal pressure is proposed. In order to investigate the effect of mode interaction between nearly simultaneous buckling modes, the panels are considered as a system having four degrees of freedom in which a Galerkin method is used to search out the nonlinear algebraic equations, namely, the large deflection equations in the presence of initial geometric imperfection. The solution is easily obtained by means of the perturbation technique. The paper also includes some examples. Calculation results show that this method is convenient and valid, and it is worthwhile pointing out that it can be extended to cylindrical panels with no abrupt change in thickness and curvature.

AUTHOR: ZHANG Jiachen [1728 1367 3819]

ORG: None

TITLE: "Some Problems Concerning the Reheat Unit Boiler and Turbine Plant Bearing Impact Load"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 180-193

TEXT OF ENGLISH ABSTRACT: The latent capacities and possible measures for the reheat unit boiler and turbine plant to bear impact load have been discussed in detail in the course of developing and regulating and based on dynamic analogy tests and industrial tests of the power-frequency electro-hydraulic control equipment for N50-130-535/535 reheat steam turbine.

AUTHOR: YUE Zhicheng [2867 1807 2052]
ZHANG Youhong [1728 2589 1738]

ORG: None

TITLE: "The Calculation of Critical Speed of Turbomachine Rotor"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 194-200

TEXT OF ENGLISH ABSTRACT: The calculating formulas and influence factors for the critical speed of the turbomachine rotor are derived with a brief description of the calculating method. The program has been proved on Computer DJS-21 at Huazhong Institute of Technology.

AUTHOR: LIU Dechang [0491 1795 2490]

ORG: None

TITLE: "Influence of Coal Properties on the Design of Fluidized Boiler"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 201-208

TEXT OF ENGLISH ABSTRACT: This paper deals with problems pertaining to the influences of the properties of coal on the heat distribution of combustion products in the fluidized bed combustor, on the size of the heated surface of the immersed tubes and that of the distributor. The influences of the steam parameters on the size of the distributor are also briefly treated.

AUTHOR: HAN Caiyuan [7281 2088 0337]

ORG: None

TITLE: "Theoretical Computation of Y-Atomizer"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 209-216

TEXT OF ENGLISH ABSTRACT: This article analyzes theoretically the flow process and atomizing mechanism of oil within the canal. Using Bernoulli's equation and the continuous equation the following formula for calculating the quantity of oil flowing has been obtained:

$$G = MF\sqrt{2g\gamma_{oil}(P_{oil} - P_{steam} + 1)}$$

where coefficient u is

$$M = \frac{1}{\sqrt{1+\zeta_0+0.3\text{[illegible]}\sin\theta+0.2\text{[illegible]}\sin^2\theta+\zeta_1}}$$

This result shows that the calculation is in conformity with experimental results.

AUTHOR: LI Fujin [2621 0154 6855]

ORG: None

TITLE: "Calculation and Analysis of the Pressure-Jet Atomizer"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 217-224

TEXT OF ENGLISH ABSTRACT: An analysis has been made of the mechanism of the pressure-jet atomizer, a new method for calculating output flow of an atomizer with a central spill hole proposed and the influence of vacuity in the air core on thethe spray angle discussed, resulting in the successful design of a new atomizer with a central jet.

AUTHOR: YING Qiguang [2019 0796 0342]

ORG: None

TITLE: "The Calculation of Torsional Vibration when Part of the Cylinders of the Diesel Engine Is in Operation"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 225-235

TEXT OF ENGLISH ABSTRACT: A method for calculating torsional vibration when only part of the cylinders of the diesel engine is in operation has been developed. It is not only suitable for the calculation of torsional vibration when part of the different types of cylinders of various kinds of diesel engines is in operation, but also for the analysis of the characteristics of torsional vibration in the case of non-uniform cylinder load.

AUTHOR: ZHANG Peirong [1728 1014 2827]
ZHAI Xingyuan [5049 5281 6670]

ORG: None

TITLE: "An Analysis of the Measurement of Static Stress in the Connecting Rod of Z12V190B High-Speed Engine"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 236-245

TEXT OF ENGLISH ABSTRACT: This article deals with the measurement problems of static stress in the connecting rod of the Z12V190B high-speed diesel engine and proposes a method for correcting these stresses. It is shown through an analysis of the tested results that 1) the nonsymmetrical "I" formed on the cross section of the connecting rod exerts a great influence on the value of stress; 2) the unreasonable construction of the connecting rod is the basic cause for rupture; 3) in the inside and outside boundary of the acting angle of tension load on the small end of the connecting rod there is a very large difference between the calculated stresses by the finite element method and the tested stresses. The cause for this difference is also discussed.

AUTHOR: ZOU Yong [6760 0516]

ORG: None

TITLE: "Early Failure Analysis of the Monochrome Picture Tube"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG INSTITUTE OF TECHNOLOGY] in Chinese No 1, Mar 80 pp 246-252

TEXT OF ENGLISH ABSTRACT: This article is a summary of the author's tests on the working life of the monochrome picture tube in 1977. According to the said tests, the cause for the early failure of the tube 40SX12B is cathode overheating and loss of vacuum condition within the tube. By regulating the cathode temperature and applying the combined exhaust techniques, the mean time of no-failure operation of this picture tube is lengthened more than four times.

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CSO: 4009

AUTHOR: TAN Changhua [6223 7022 5478]
XU Mingzhen [6079 6900 4176]

ORG: Both of the Department of Computer Science

TITLE: "The Direct Determination of Dopant Concentration Profile in Silicon Epitaxial Layers by Constant Current Non-Equilibrium MOS Characteristics"

SOURCE: Beijing BEIJING DAXUE XUEBAO (ZIRAN KEXUE BAN) [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 1, 1980 pp 17-27

TEXT OF ENGLISH ABSTRACT: A new simple, rapid and accurate method for the determination of dopant concentration profile in silicon epitaxial layers is described. This method is more exact than the Schottky Barrier method in that it avoids the influence of the back conductive current. This method is wider in the range of its determination than the conventional MOS C-V method in that it avoids the limitation of the double Fermi potential. This method is quicker than the widely used pulse method of the MOS structure by the realization of direct determination. Therefore, the dopant concentration profile measured by this method is a better approximation for the practical carrier profile in silicon epitaxial layers. This method is appropriate for rapid characterization of silicon epitaxial layers in the automatic production process.

AUTHOR: YU Daoheng [0151 6670 5899]
LI Shizheng [2621 0013 6927]
YANG Taichun [2799 3141 2504]
et al.

ORG: All of the Department of Physics

TITLE: "The Experimental Study of Double Mesa Silicon IMPATT"

SOURCE: Beijing BEIJING DAXUE XUEBAO (ZIRAN KEXUE BAN) [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 1, 1980 pp 28-33

TEXT OF ENGLISH ABSTRACT: An experiment of a double mesa silicon IMPATT diode is made. By selecting the same physical parameters, adopting suitable leading lines and improving the thermal contact between dies and envelopment, we determine the optimum diameter of the mesa. The double mesa silicon IMPATT realizes power addition and produces 800 mw CW and 6.5 percent efficiency at 7.7 GHz.

AUTHOR: ZHAO Chen [6392 3819]

ORG: Department of Chemistry

TITLE: "Electronic Structure of Mononuclear Complexes. II. Tetracyclopentadienyl Complexes of Actinides"

SOURCE: Beijing BEIJING DAXUE XUEBAO (ZIRAN KEXUE BAN) [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 1, 1980 pp 44-48

TEXT OF ENGLISH ABSTRACT: The electronic structures and properties of the tetracyclopentadienyl complexes of Th, Pa, U and Np were discussed using the linear combination of bond orbitals (LCBO) MO method proposed in Report I.

AUTHOR: LI Nanqiang [2621 0589 1730]
GAO Xiaoxia [7559 1420 7209]

ORG: Both of the Analytical Chemistry Teaching and Research Group, Department of Chemistry

TITLE: "A Catalytic Wave of Chromium and Its Application to the Determination of Chromium (VI) and Chromium (III) in Water"

SOURCE: Beijing BEIJING DAXUE XUEBAO (ZIRAN KEXUE BAN) [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 1, 1980 pp 49-54

TEXT OF ENGLISH ABSTRACT: In a supporting electrolyte containing 1.5 x 10^{-3} M ethylene diamine, 0.1 m $NaNO_2$ and at pH 8-9, we obtained a sensitive polarographic catalytic wave of chromium (VI or III). The catalytic wave is in a peak form with peak potential between -1.6 v and -1.7 v (S.C.E.). The limit of detection for chromium is 1 x 10^{-9} M (0.05 ng/ml). The method has been applied to the determination of Cr (VI) and Cr (III) in tap water.

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CSO: 4009

AUTHOR: WANG Yangyuan [3769 7122 0337]
HAN Ruqi [7281 3067 3823]
ZHANG Guobing [1728 0948 2671]
JI Lijiu [0679 0448 0036]

ORG: All of the Department of Computer Science

TITLE: "The Electrical Properties of Polycrystalline Silicon Film (I)"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 2, 1980 pp 16-23

TEXT OF ENGLISH ABSTRACT: The electrical properties of polycrystalline silicon are more complicated than are those of single crystalline silicon. The results concerning the relation between mobility and dopant concentration obtained by John Y. W. Seto are consistent with those obtained by T. I. Kamins. We point out that both sets of results hold good only to a certain range. In this paper, a theory concerning the relation between mobility and dopant concentration is developed. According to this theory, there exists a minimal value of mobility in the range of medium dopant concentration and a maximal value in the range of high dopant concentration. We have also given the value of the concentration corresponding to the minimal and maximal value of mobility, together with the relationship between these values and grain sizes.

AUTHOR: TAN Changhua [6223 7022 5478]
XU Mingzhen [6079 6900 4176]

ORG: None

TITLE: "The Constant Current Transient Technique for Determination of Electrical Parameters in Silicon Chip and MOS Properties"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 2, 1980 pp 24-36

TEXT OF ENGLISH ABSTRACT: A new method for the determination of electrical parameters in silicon chip and MOS properties by the constant current transient technique is described. The MOS structure is maintained in the different transient states by the change of the displacement current, therefore a rapid determination of electrical parameters (conductivity type, impurity concentration, minority carrier lifetime and surface avalanche breakdown) in silicon chips and properties (SiO_2 thickness, flat-band voltage and factor a) of the MOS structure are completed. High precision of determination of impurity concentration will be expected because the impurity concentration is independent of the SiO_2 thickness. The determination of the conductivity type of silicon chips is a direct result of determining the impurity concentration, so the special checks of the conductivity type of the silicon chips are not needed. After a series of intuitive and continuous observations of the surface avalanche breakdown of silicon chips, it has been found that a kind of characteristic of the breakdown capacity of the nonequilibrium MOS structure can be distinguished from the traditional results.

Other parameters can be rapidly and simply measured by the transient technique also.

AUTHOR: ZHENG Yaoqing [6774 3852 7230]
GUAN Yiwen [1351 1355 2429]
NIU Jingjin [3662 2529 6855]
SUN Yiliang [1327 0076 2856]

ORG: All of the Department of Chemistry

TITLE: "Studies of the Organophosphorus Pollutants in the Well Water Near a Dimethoate Plant. I. Gas Chromatographic Method for the Identification of the Main Pollutants"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 2, 1980 pp 90-96

TEXT OF ENGLISH ABSTRACT: The well water near an organic phosphorus pesticide plant manufacturing Rogor (Dimethoate) and DDVP has long been suspected to be polluted by the plant effluent. For characterization of the main pollutants in the well water, a dual column GC method of identification was applied using two GC columns with different polarity. One glass column, with dimensions of 0.8 m x 2.5 mm, was packed with 3 percent DEGA on Celite 545 (AW DMCS, 60-80 mesh), and the other, with dimensions of 1 m x 3 mm, was packed with 5 percent DC-710 on the same support. A FPD with a 525 nm P-filter and a 394 nm S-filter was employed. Water samples, taken from different polluted wells around the plant during all seasons of a two-year period, were extracted with 1/100 their volume of benzene, and the benzene extracts were then concentrated in a Kuderna-Danish evaporator.

[Continuation of BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN No 2, 1980 pp 90-96]

After enrichment of the samples to a factor of 2 x 10^3, the benzene extracts were injected into the gas chromatograph. It was constantly found that 7-8 peaks appeared in the chromatograms, three of them being predominant. By comparison of the retention time of the three main unknowns with those of the known standards, two peaks were successfully identified to be O, O, S-trimethyldithiophosphate (2053-29-9) and O, O, O-trimethylthiophosphate (152-18-1). Both were the first stage by-products in the synthesis of Dimethoate as P_2S_5 reacted with methanol to yield O, O-dimethyldithiophosphoric acid. The third main pollutant failed to be identified, but it was also a P- and S-containing organic compound, emerging from the Dimethoate workshop in the pesticide plant. The pollutants in the well water were at a ppb level, but the contamination had already caused an unpleasant taste and odor.

AUTHOR: CHEN Bin [7115 3453]

ORG: Department of Mechanics

TITLE: "Friction-Induced Oscillation in Gyro-Stabilization Platform"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 4, 1979 pp 7-19

TEXT OF ENGLISH ABSTRACT: In the current literature a conventional yet imperfect view considers friction torque in the stabilization axis of gyro-stabilization platform only as a damping factor and thus not as a possible cause for the self-excited oscillation in the platform. This problem is studied here by way of methods used in nonlinear oscillation theory. The results show that there does exist the possibility of friction-induced oscillation for a platform on a base moving along with the earth, as well as for one on a stellar base.

AUTHOR: RU Binggen [5423 3521 2704]
DU Jinzhu [2629 6930 3796]
ZENG Yaohui [2582 5069 6540]
et al.

ORG: All of the Department of Biology

TITLE: "Active Products of Porcine Trypsin After Autolysis"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 4, 1979 pp 32-47

TEXT OF ENGLISH ABSTRACT: 1. Porcine trypsin obtained from pancreas residues subsequent to insulin removal underwent autolysis when subjected to chromatography and gave rise to new active forms of autolyzed products with intrachain split at bond Lys_{145}-Ala_{146}, Arg_{105}-Val_{106}.

2. Incubation of 1 percent solutions of porcine trypsin either at pH 5.0 or at pH 9.2 induced autolysis to give active products involving one or two specific cleavages of bond Lys_{145}-Ala_{146}, Arg_{105}-Val_{106} or Lys_{131}-Ser_{132}, as well as inactive degraded products. No evidence was obtained that on autolysis of porcine trypsin any active fragment with lower molecular size than the parent molecule was identified.

3. The active forms of autolyzed products of porcine trypsin had almost the same specific activity as did the intact enzyme when assayed against BAEE. They were

[Continuation of BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN No 4, 1979 pp 32-47]

of the same molecular size as the parent molecule. These findings indicated that the active forms of autolyzed products maintained the specific three-dimensional structure essential for the catalytic activity of the trypsin molecule.

AUTHOR: RU Binggen [5423 3521 2704]
HUANG Yuzhi [7806 3768 5347]
ZHANG Longxiang [1728 7893 5046]

ORG: All of the Department of Biology

TITLE: "Recovery of a Trypsin Inhibitor from Pancreas Residues and Waste Liquors Subsequent to Insulin Removal by Affinity Chromatography"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 4, 1979 pp 48-56

TEXT OF ENGLISH ABSTRACT: Either the waste pancreas residue subsequent to insulin extraction of the pH 6.0 mother liquor after crystallization of zinc-insulin can be used for the isolation of pancreatic trypsin inhibitor. An efficient method for separating and purifying the inhibitor which employs immobilized trypsin cross-linked on silica gel or covalently-linked to cellulose has been developed and tested on pilot-plant production scale.

From the waste pancreas residue corresponding to 100 kg of fresh porcine pancreas, a total of 4.12 g of lyophilized powder of pancreatic trypsin inhibitor could be obtained, with a potency of 175-210 T.I.U. per mg lyophilized powder. An additional amount of 0.6 g of the inhibitor could be obtained from the pH 6.0 mother liquor, with a potency of 200 T.I.U. per mg lyophilized powder.

[Continuation of BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN No 4, 1979 pp 48-56]

A preliminary study of the properties of the porcine pancreatic trypsin inhibitor shows that the inhibitor is a basic polypeptide of relatively low molecular weight. It is different from the Kunitz inhibitor and resembles the Kazal inhibitor in inhibition specificity.

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CSO: 4009

AUTHOR: LU Jiaqiang [4151 1367 6973]
ZHANG Yunbing [1728 0336 0014]

ORG: LU of Guangzhou Spun Silk and Raime Mill; ZHANG of Guangzhou Chemistry Research Institute

TITLE: "Modification of Raime by Alkali Treatment"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 1-4

TEXT OF ENGLISH ABSTRACT: The basis and the technological process with concerned parameters of the modification of raime by alkali treatment were described. The cross section of the modified raime fiber has been increased by about 20 percent, but its strength has been decreased by about 25 percent. Other properties, including elongation, curling, hydroscopicity, carding properties, and strength, as shown in mixed fibers, were all improved. The woven fabrics of modified raime fiber exhibit better rubbing fastness, good anti-creasing properties and a high rate of dye uptake. The application of the modified raime fiber in blended polyester-raime textiles for more than three years has been proved their qualities of better spinning, weaving and wear.

AUTHOR: CHEN Yunchang [7115 0061 2490]

ORG: Shanghai Textile Research Institute

TITLE: "An Analysis of the Twisting Tension and Its Variation on the Flyer Throwing Machine"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 5-12

TEXT OF ENGLISH ABSTRACT: By a dynamics analysis of twisting flyer movement, an approximate formula for twisting tension on the flyer throwing machine is suggested and proofs are given to the following: the twisting tension has a relation to the square of the spindle speed as well as the fourth power of the twisting flyer radius and is in inverse proportion to the unwinding bobbin diameter; the change of the unwinding point height causes twisting tension to have a periodic fluctuation of large amplitude. Additionally, some propositions have been made for the improvement of the quality of twisted yarns and the trend of the development of the equipment of this type.

AUTHOR: HANG Youqun [5887 2589 5028]

ORG: Northwestern Cotton Mill No 1

TITLE: "Construction Design of Poplin"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 13-18

TEXT OF ENGLISH ABSTRACT: This is a study of the constructional principle and the construction designing of poplin, with particular reference to the standard ranges of warp and weft cover factor, total cover factor and density ratio between warp and weft.

AUTHOR: HE Minying [0149 2404 5391]
JIN Shengxiang [6855 0524 4382]
SHEN Songling [3088 2646 7881]
ZHU Hongcheng [6175 3163 2052]
GU Yucai [7357 3768 2088]

ORG: HE, JIN and SHEN all of Shanghai College of Textile Technology; ZHU and GU both of Shanghai Canvas Mill No 5

TITLE: "Design of Weft Insertion System of Flexible Rapier"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 19-26

TEXT OF ENGLISH ABSTRACT: With the intention of reducing the dynamic loading on flexible rapier mechanisms, several typical types of these mechanisms were analyzed and an approximate formula was suggested for calculating the force acting on the mechanism. With reference to the parameters involved in the formula, the paper discussed the problems to which attention should be paid in designing.

AUTHOR: HUANG Maofu [7806 5399 4395]
YANG Yuqin [2799 3768 3830]
XU Shuyu [6079 1466 3254]

ORG: All of Shanghai Textile Industrial College

TITLE: "Process of Preparing Rapidazol Black and Its Application to Calico Printing"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 27-36

TEXT OF ENGLISH ABSTRACT: In this paper, (1) an investigation was made of the effects of such parameters as liquor ratio, amount of sodium sulfite required, pH value and reaction temperature on the yield, stability and reaction speed of the diazonium sulfonic acid, with a better and more reasonable preparation process being thus suggested; (2) the controlling of moisture content was taken as the key point to the steam developing method of Rapidazol Black in calico printing; and (3) the neutral substitute for chrome alum in printing paste has been studied with the intention of reducing pollution; sodium or potassium idodate and sodium chlorate being recommended as desirable substitutes.

AUTHOR: HUANG Hanwen [7806 3352 2429]

ORG: Wuxi Cotton Mill No 2

TITLE: "A Study of the Relations between the Hardness of Detached Roller and Evenness of Combed Sliver"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 37-38

TEXT OF ENGLISH ABSTRACT: After comparing the results of the various hardnesses of the detached rollers used in our cotton mill, we determined the relations between the hardness of the detached roller and the quality of the combed slivers.

AUTHOR: LI Kejian [2621 0344 0313]

ORG: Physical Laboratory, Jinan State Cotton Mill No 1

TITLE: "An Approach to the Manipulation of Yarn Quality through Controlling Roving Strength"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 39-41

TEXT OF ENGLISH ABSTRACT: Based upon experiences over a long period, a way of controlling yarn quality by means of controlling roving strength has been derived so as to meet the requirements of stabilizing the break-end rate and improving the quality of cloth surface. The relationship between the roving strength and yarn quality is enumerated. The method of controlling roving strength and the main standard criterion of selecting the roving strength are set up as well.

AUTHOR: HU Weili [5170 0251 4409]

ORG: Shanghai Municipal Textile Fiber Inspection Bureau

TITLE: "Inspection of the Maximum Possible Number of Slubs or Thin Places on Yarns"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 42-44

TEXT OF ENGLISH ABSTRACT: The maximum possible number of slubs or thin places on yarns can be estimated by the formula $S = \frac{-2.3026}{a} \log(\frac{k}{n})$ through the inspection of the presence of slubs or thin placec on 100 blackboards. The result has a confidence limit of 90 percent and reliability of 96.17 percent. As an auxiliary parameter, this maximum possible number has a certain reference value when it is used considering the effect of optimum technological conditions on the linear density of slubs and fine ends.

AUTHOR: CAI Pu [5591 3302]
HUANG Danxiang [7806 0030 7449]

ORG: CAI of Shanghai Textile Industrial College; HUANG of Shanghai College of Textile Technology

TITLE: "Weber Distribution and Its Applications in Textile Industry"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 45-48

TEXT OF ENGLISH ABSTRACT: This paper shows the derivation of the Weber distribution function, describes the method of making Weber coordinate paper and introduces its applications with examples and data attached.

AUTHOR: ZHAO Shu [6392 2579]

ORG: Beijing Blanket Mill

TITLE: "Artistic Design of Woolen Blanket"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 49-52

TEXT OF ENGLISH ABSTRACT: This paper describes: (1) points for attention in the artistic design of woolen blankets, (2) the features of the subject matter of a pattern, (3) the artistic presentation form of a designer's fancy, (4) the rules for composing a pattern and (5) the peculiarities in color of a pattern.

AUTHOR: HUANG Jiazhen [7806 08572823]

ORG: Tianjin Knitting Technical Research Institute

TITLE: "Application of Gassed Rubber Roller to Rope Washer"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 53-56

TEXT OF ENGLISH ABSTRACT: The substitution of the gassed rubber roller (gas filling pressure 4 kg/cm^2, internal working pressure 2 kg/cm^2) for the conventional rubber squeezing roller may lessen the elongation and loop distortion of cotton knitted fabrics during rope washing treatment, and so decrease the fabric shrinkage deterioration in use.

AUTHOR: HE Linyu [0149 7792 3768]

ORG: Shanghai Textile Machinery Works No 1

TITLE: "The Designing and Investigation of A172-AU052 Two-Stage Dust Filter"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 57-67

TEXT OF ENGLISH ABSTRACT: By analyzing the advantages and disadvantages and comparing with other types of dust filters, the special construction and features of the A172-AU052 dust filter were pointed out. It has been used on a scutcher to test and analyze its filtering resistance. It has been proved that this two-stage filter can remove dust of a submicron order and the full filtration efficiency amounts to 99.6 percent with the advantages of low power consumption (10~15 KW for an air quantity of 10,000 m^3/hr), low capital investment and less floor space.

AUTHOR: ZHENG Ruicong [1728 3843 5115]

ORG: Shanghai Textile Research Institute

TITLE: "Physical and Chemical Properties of Type 180 Self-Crosslinking Emulsion Acrylate Adhesive and Its Application"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 68-73

TEXT OF ENGLISH ABSTRACT: This article gives a description of physical and chemical properties of the self-crosslinking type of emulsion acrylate adhesive and its application to Terylene (polyester) weft-knitted outerwear and woolen sweaters in preventing pilling and teaseling and to the non-woven fabrics with the corresponding technology and the mentioned effects.

AUTHOR: SHI Jifa [0670 3444 3127]

ORG: Shanghai Cotton Mill No 6

TITLE: "A Miniature Trial Spinning System"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 74-75

TEXT OF ENGLISH ABSTRACT: The miniature trial spinning system consisting of a simplified flock chute-fed card, a single-delivery drawing frame and an eight-spindle spinning frame was introduced. With this system it took only about an hour to realize a trial plan with stable and satisfactory results.

AUTHOR: SHAO Shihuang [6730 0013 3552]
YANG Mingan [2799 2494 1344]
GU Pinggao [7357 1627 7559]

ORG: SHAO of Shanghai College of Textile Technology; YANG of Shanghai Knitting Machinery Works No 1; GU of Shanghai Sock Factory No 1

TITLE: "New Electronic Control Apparatus for Brush"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 2, 1980 pp 76-77

TEXT OF ENGLISH ABSTRACT: This paper deals with the circuit of a new electronic apparatus for controlling brush and gives the theoretical analysis of this control system. The apparatus will keep the weft incimation within the range of 0~30 cm.

AUTHOR: ZHANG Hanyang [1728 3352 7122]

ORG: Northwestern Cotton Mill No 5

TITLE: "Determination of Cotton Fiber Length by Weight Ratio"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 2-7

TEXT OF ENGLISH ABSTRACT: By investigating more than 10 length expressions of different measuring methods, the principle ones are: (1) available mean length; (2) percentage of lint content. An account is given of the way to cut the fiber sample into four lengths (a = 1.5 mm, b = 3.75 mm, c = 10 mm, d = an indefinite length) after the removal of its lint with a "Section Cutter with Double Knives." The mean length of the usable fiber is rather accurately calculated from the specific value of the fiber thickness of section b to section c after weighing. By analysis, comparison and mathematical verification, this method proves to be simpler in practice and higher in reproducibility than the roller measuring method.

AUTHOR: LIU Dingwu [0491 1353 2976]

ORG: Shanghai Spun Silk Mill

TITLE: "A Study of the Mulberry Cocoon Degumming Process"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 8-13

TEXT OF ENGLISH ABSTRACT: This article offers a boiling-off technology for mulberry cocoons by degumming them with enzymes. It also gives a description of the mechanism of this process. The data from the control tests of the old process and this new one as well as the production practice in recent years illustrate that this process has made progress in raising the quality and labor productivity, shortening production operations and saving energy.

AUTHOR: XU Mingjiu [1776 6900 0046]

ORG: Dalian Institute of Light Industry

TITLE: "Working Principle of Pressure Bar Curved Drafting System"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 14-20

TEXT OF ENGLISH ABSTRACT: In this paper the working principle of a pressure bar curved drafting system and the rational technology is studied. The quantitative relationship between the pressure acting on the strand by the pressure bar and the tension existing in it have been analyzed by a mechanical method, and the rule of the additional frictional force zone produced by the pressure bar is determined.

AUTHOR: WANG Xianjia [3769 3759 0857]

ORG: Shanghai Textile Engineering College

TITLE: "How to Reduce the Noise of Comber Nippers"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 21-25

TEXT OF ENGLISH ABSTRACT: After analyzing the factors affecting the impulsive force of the nippers, this paper puts forward three measures to reduce the noise of comber nippers: (1) to prolong the closure period of nippers appropriately and have the peak speed take place ahead of schedule so as to lower the impulsive speed, (2) to decrease the weight of the top nipper, and (3) to raise the bending pliability by grooving the bottom nipper. Consequently, the noise of the comber has been reduced by 4.5 db.

AUTHOR: JIANG Huai [1203 2037]
REN Huanjin [0117 3562 6855]
GU Dee [7357 1795 1230]

ORG: All of Shanghai Textile Engineering College

TITLE: "The Yarn Guiding and Yarn Winding Differential Equation and Its Application"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 26-33

TEXT OF ENGLISH ABSTRACT: This article takes winding as an example, making a study of the implicit connection between the movements of the yarn guiding point and the traveling of the yarn winding point along the generating line of the yarn package. The yarn guiding and winding differential equation is thus deduced which will theoretically lay the foundations for the analysis of package build-up. This equation can be used to evaluate the structure of the yarn package and its build-up quality, and to work out the details of yarn guiding and the contour line of the yarn guiding cam.

AUTHOR: CHEN Chongkun [7115 1504 0981]
ZHANG Jiaxi [1728 1367 3588]

ORG: Both of Suzhou Chemical Fiber Plant

TITLE: "An Analysis of the Design Principle of Drive System and Drying Chamber of the Slasher Model HF-14"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 34-41

TEXT OF ENGLISH ABSTRACT: In this paper the principle and application of drive system and drying chamber design method of the slasher Model HF-14 is discussed. The following points have been made clear: (1) a large air flow of low pressure can improve the drying effect, especially in drying fabrics from hydrophobic chemical fibers, (2) the efficiency of the radiator can be raised by distributed heating and the power consumption can be reduced by using low pressure axial flow blower, and (3) the even temperature distribution in the drying chamber and the large air flow reduce the steam consumption and improve the drying effect, which is especially desired in processing fibers withstanding no high temperatures.

AUTHOR: YUAN Guanluo [5913 6034 3157]
ZHANG Dagang [1728 1129 0474]
LU Weimin [0712 3634 3046]
CHENG Qishi [4453 6386 2514]

ORG: All of Zhejiang Institute of Silk Technology

TITLE: "Measurement of Shuttle Flying Velocity in the Shed of a Silk Loom"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 42-45

TEXT OF ENGLISH ABSTRACT: In this paper a description has been given of the methods of measuring instantaneous velocity of the shuttle by placing transducers at seven test points along its track. The deceleration at each point has been calculated. Thus, the paper suggests that increasing the shuttle flying time can reduce the shuttle velocity and consequently save materials and energy.

AUTHOR: WANG Guanhua [3769 0385 5478]
LI Dejun [7812 1795 6874]

ORG: Both of Wuxi Textile Institute

TITLE: "Test and Analysis of the Filling Insertion Process in Broad Air-Jet Loom"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 46-50

TEXT OF ENGLISH ABSTRACT: On the basis of testing and analyzing the relationships between variables such as pressure change within the air cylinder in the filling insertion system, speed attenuation of axial flow through the confusor, corresponding filling flying speed, variation of flying conditions of filling and the relationship between the length of the main nozzle and the filling flying speed, technical measures to raise the filling insertion speed and reduce the selvage contraction in the filling direction are discussed for the air-jet loom of 1700 mm in width.

AUTHOR: HAN Dazhao [7281 1129 3564]
GU Sunnan [7357 5549 0589]

ORG: Both of Shanghai Printing and Dyeing Machinery Works No 1

TITLE: "Analysis of Washing Treatment of Fabric and Test of Model WS Open Width Washing Machine with Horizontally-Guiding Roller"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 51-56

TEXT OF ENGLISH ABSTRACT: In this paper a brief description is given of the basic principle of mass exchange during washing operations. Also discussed are the following items: the theory improving the washing effect by increasing the coefficient of diffusion, enlarging the concentration gradient and reducing the course of diffusion and the corresponding measures such as high temperature, agitation, more immersion and compression, intensive washing and small wash liquor volume. Two different types of washing machines, model WS with horizontally-guiding rollers and model YS-180 with a suction perforated drum, are introduced. The performance of the former machine proves that the above-mentioned theory is practicable, while the latter one opens the path to tensionless washing required for porous cloth, for example, loosely knitted fabrics.

AUTHOR: QIAN Xiaoping [6929 1420 5493]

ORG: Suzhou Silk Sample Making Factory

TITLE: "An Approach to Ideal Tubular Weave"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 57-61

TEXT OF ENGLISH ABSTRACT: A practical method is described to solve the problem of the fringe continuation of tubular weave with a constant fly number, and its validity is proven theoretically.

AUTHOR: ZHANG Hongqi [1728 1347 6386]

ORG: Shanxi Woolen Mill No 1

TITLE: "Study and Application of Equipotential Point Reduction Bleaching of Protein Fibers"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 62-65

TEXT OF ENGLISH ABSTRACT: With wool keratin fibers as the object, a discussion is made on (1) the state of "equipotential point" and the selection of bleaching agents, (2) the use of the discharging agent, formaldehyde sodium sulphoxylate, as a bleaching agent for wool fabrics, and (3) the process of "equipotential point" reduction bleaching.

AUTHOR: LU Jie [7120 0267]

ORG: Shanghai Chemical Fiber Plant No 6

TITLE: "An Approach to the Improvement of the Reactivity of Cotton Pulp"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 66-70

TEXT OF ENGLISH ABSTRACT: This article deals comprehensively with the following factors affecting the reactivity of cotton pulp, such as the cotton maturity, impurities, impurity amount in cotton lints, pulp-preparing technology, degree of polymerization (DP), and DP distribution throughout the pulp. A process of "more steaming but less bleaching" and the control of DP of the pulp at about 530 are suggested.

AUTHOR: YANG Ming [2799 3046]
WU Bengang [0702 2609 0474]

ORG: Both of Wafangdian Cotton Mill

TITLE: "Polypropylene Manufactured with Liquid-Phase Bulk Polymerization Process and Its Uses"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 71-75

TEXT OF ENGLISH ABSTRACT: The characteristics of the bulk polymerization process of manufacturing polypropylene are described. It is a short process with less equipment, low investment, cheap production costs, no pollution and no need of special materials and machinery.

AUTHOR: LI Xiaming [2621 0204 2494]

ORG: Qingdao Cotton Mill No 6

TITLE: "The Method and Its Application for Producing Long Period Different Size Yarn"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 4, 1980 pp 76-77

TEXT OF ENGLISH ABSTRACT: This paper introduces a method for spinning different diameter yarns with a wave length of more than 1.5 times the width of the cloth, the end product of the yarn and a "tex ratio" of the thick section to the thin section about 2.5, and offers a practical process for manufacturing yarn of average tex No 77.

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GEOTHERMAL FIELD STRATIGRAPHIC PRESSURE GRADIENTS ANALYZED

Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 2, 22 Apr 80 pp 1-8

[Article by Wang Zhongying [3076 0112 5391], Zhou Shaoguang [0719 7300 0342] and Tang Songran [2282 2646 3544]: "Categorization of Stratigraphic Pressure Gradients in Geothermal Fields and the Laws of the Stratigraphic Gradient in the Yangbajing Geothermal Field"]

[Text] Abstract: Geothermal reservoirs, whose hot fluid can be continuously replenished, are open-type structures, in contrast to oil and natural gas reservoirs which are basically of the closed type. Accordingly, the stratigraphic pressure classification methods used in drilling oil and gas wells are basically not applicable to geothermal boreholes. This article attempts to classify stratigraphic pressures in geothermal wells and studies the geothermal gradient laws of the Yangbajing Geothermal Field. The equations presented have been tested in 3 years' drilling experience at the Yangbajing field against the actual data from more than 10 wells.

1. Statement of the Problem

The Yangbajing Geothermal Field, Tibet, is our country's first high-temperature moist steam geothermal field. Because the reservoir is shallowly buried (already encountered at 20-30 meters) and is in a thick stratum (several hundred to more than 1,000 meters), while the cover layer is thin and brittle, it is very difficult to control the pressure within the well. If the specific gravity of the mud is too low, it may result in gushing, while if it is too high it may result in infiltration followed by gushing. An even more difficult problem is that if the uncased bottom section of the well is a bit too long, it may result in gushing in the upper section and infiltration below. In the first 2 years of prospecting, serious gushing caused stratigraphic subsidence, well-head explosions or surface cracking, resulting in the abandonment of 4 wells during the drilling process, drilling work was unable to continue, since there was a grave threat to construction safety.

The experience of well drilling at the Yangbajing Geothermal Field has posed a series of problems:

A. How great a pressure is involved in serious blowouts? Can they be controlled with mud?

B. On the basis of foreign experience with geothermal wells and well suppression, a method of pressurised cold water control of blowouts has been published; why can this be successfully used on some wells at the Yangbajing field but not on others? How should the well pressurizing method be chosen at the Yangbajing field?

C. Why cannot the length of the uncased bottom section be too long, particularly in a shallow section, without the danger of gushing above and infiltration below. How should the position of the casing point be chosen?

D. How should the mud specific gravity be chosen in order to control the pressure inside the well and prevent both blowouts and infiltration?

E. Why do some wells gush naturally after completion, while others must be subjected to gas lift or some other special method to induce gushing? Why is the pressurized cold water method of inducing flow which is used extensively abroad not applicable to some wells at the Yangbajing field?

Although these engineering problems differ from each other, they are all constrained by a common factor, namely stratigraphic pressure and the pressure gradient.

The problem of stratigraphic pressure and pressure gradients is a serious one which urgently requires solution. It has long received serious attention in the petroleum and natural gas well drilling world, and many methods for prediction before or during drilling have been developed,[1] such as the seismic method, which uses data on the propagation of manmade seismic waves, the sonic logging and inductance logging methods based on logging data from wells with known characteristics, the d-coefficient method which uses engineering data from the drilling of the well, and the like. In addition, on the basis of the conditions of formation and accumulation of oil and gas reservoirs, strata have been classified as high-pressure, normal-pressure and low-pressure types. The methods and the classification have reference value for the drilling of oil and gas wells, but because the stratification, heat reservoir characteristics and reservoir structure of geothermal fields differ widely from those of oil and gas strata and reservoirs, oil and gas well stratigraphic pressure classification and prediction methods are basically inapplicable to geothermal wells. To date no one in this country or abroad has attempted a classification or calculation of stratigraphic pressure in geothermal wells. We have published an article[2] providing a simple introduction to stratigraphic pressure gradients in geothermal fields as one of the problems of geothermal well drilling technology. The present article will supplement and extend the previous one. Because of limited space, certain mathematical manipulations and universally known concepts are omitted. Interested readers may consult another article in the collection from the Second Technical Conference of the Prospecting Engineering Committee of the China Geological Society.[3]

2. Classification of Stratigraphic Pressure Gradients

In order to clarify the pressure-bearing states of strata in a way that is helpful in choosing the proper engineering approach, we must analyze the data in terms of pressure. Because stratigraphic pressure gradients are closely related to engineering questions, to the sedimentary environments of strata and to later compaction or pressure release effects, the stratigraphic pressure classifications are all based on the magnitude of the stratigraphic pressure gradient.

In oil or gas wells, strata are generally classified as high, normal or low pressure types on the basis of whether or not there have been subsequent compaction or pressure leakage effects.

In high-pressure strata, the pressure gradient is from more than 0.107 to 0.23 kg/cm^2-m;

in normal-pressure strata the pressure gradient is from 0.10 to 0.107 kg/cm^2-m;

in low-pressure strata the pressure gradient is from 0.092 to 0.055 kg/cm^2-m.

With the original sedimentary state unchanged, strata which have not been tightly sealed and compacted or had pressure leakage are normal-pressure strata; because the pressure gradient of fresh water is 0.10 kg/cm^2-m and that of sea water is 0.107 kg/cm^2-m, in fresh water facies (lacustrine) or sea water facies (marine) sedimentary strata the pressure gradient of a normal-pressure stratum should be between the gradients of fresh water and sea water, i.e., between 0.10 and 0.107 kg/cm^2-m.

Stratigraphic pressure gradients higher or lower than those of normal-pressure strata are the result of subsequent sealing and compaction or pressure leakage and migration. The upper limit of the stratigraphic gradient in high-pressure strata, which is 0.23, is determined from the cap rock pressure gradient. For loose, unconsolidated strata, the cap rock pressure gradient is equivalent to the maximum internal pressure that can be borne by the stratum. If it exceeds 0.23, there is a danger of forcing through the cap rock. This is why 0.23 is defined as the upper limit; the numerical value is obtained by calculation.

The factors and strata producing thermal reservoirs are different from those producing oil and gas reservoirs. Geothermal reservoirs are usually associated with volcanic rock, and the reservoir structure is generally of an open type. The cause of formation of hot fluid is that cold surface water penetrates underground through cracks, and after heat exchange with deeply buried hot rock bodies, it rises again through structural cracks to some shallowly-buried porous or fissured stratum, where part may still pass to the surface and be lost. This type of system is an open system, and there is no question of later compaction. Accordingly, the stratigraphic pressure classification method based on subsequent compaction effects which is used for oil wells has no theoretical or real meaning for geothermal wells.

However, geothermal reservoir strata actually do have different pressure states. The deciding factor is not subsequent compaction, but rather the temperature of the reservoir and the depth at which it is located. High pressures can occur particularly in shallowly-buried reservoirs. More deeply buried ones are generally of normal or low pressure.

On the basis of blowout control and infiltration prevention characteristics of geothermal wells, we can make the classification of geothermal well strata shown in Table 1.

Table 1. Stratigraphic Pressure Classification of Geothermal Strata

Stratigraphic pressure category	Stratigraphic pressure gradient (kg/cm^2-m)	Well construction characteristics
High pressure	Over 0.12 to 0.23	Heavy mud; blowout prevention equipment; easy spontaneous gushing
Normal pressure	0.10 to 0.12	Plain water or nonheavy mud; blowout prevention equipment; easy spontaneous gushing
Low pressure	More than 0, less than 0.10	Foam or air, or use water with alternate infiltration and drilling
No pressure	Zero or less	Foam or air, or water with alternate infiltration and drilling; permanent stoppage

When the pressure balancing well-drilling method is used, Table 2-1 can be used for suitable selection of drilling fluids, including the following series of drilling fluids of different specific gravities: heavy mud → light mud → plain water → foam (air dispersed in water) → fog (water vapor dispersed in air) → air. These fluids can be used in the range between high-pressure strata with gradients of 0.23 down to zero-pressure strata with gradients of zero. If we use powdered galena as a specific gravity increaser, the fluid can even be used in super-high-pressure strata with pressure gradients as high as 0.33-0.36. But such strata have not yet been found in geothermal fields, and are quite rare even in oil and gas wells.

3. The t(Z) Function Relating Stratum Temperature and Depth

We discuss below the fact that in hot water depth-averaged specific gravity calculations and stratigraphic pressure and pressure gradient calculations we must understand the law governing the variation of stratum temperature with depth; we call this law the function $t(Z)$:

$$t = t(Z) \qquad (3\text{-}1)$$

where Z is the depth and t is the stratum temperature. The derivative dt/dZ is the stratum temperature gradient.

Because of the complexity of subterranean conditions, the function t(Z) has many forms. Here, on the basis of moist-steam type geothermal fields we can make an analysis of possible forms of the function t(Z) in terms of heat transfer theory and propose some approximate calculation methods.

According to heat transfer theory, heat transfer is limited to three types: radiation, convection and conduction. Each type has its own particular conditions. Radiative heat transfer requires a relatively high heat source temperature to reach any substantial level, while thermal reservoirs are generally at rather low temperatures, usually not exceeding 200-300°, so that radiative transfer can be ignored in comparison with the other two types of heat transfer. Convective heat transfer requires the presence of a fluid, and the transfer process is accompanied by mass displacement. Accordingly, this type of heat transfer exists only in water-containing strata or heat reservoir strata. Conductive heat transfer relies on the thermal motion of molecules of solid matter, and it does not require transfer of mass. Accordingly, theoretically this type of heat transfer should exist in any type of stratum, but because rocks and strata are poor conductors of heat, the heat transfer coefficient is very low, so that in water-containing strata the effect of conduction can be neglected in comparison with that of convection, while in nonwater-containing strata or cover layers, because the effect of convection is very small, the effect of conduction cannot be neglected, and it is the main heat transfer type in nonwater-containing strata.

Thus, on the basis of the heat transfer characteristics of strata we can very roughly classify geothermal field strata as convective or conductive. The former type are water-containing layers, such as heat reservoirs and cold-water-containing strata. The latter are nonwater-containing strata such as the cap rock, water-enclosing strata of thermal reservoirs and other nonwater-containing strata. Below we discuss the thermal gradient characteristics and t(Z) function for these two types of strata.

A. Conductive Strata

The decline of geothermal flow with time is very slow, and accordingly for heat conduction we can use the Fourier equation for stable heat flow:

$$q = \frac{\lambda}{Z - Z_0} (t - t_0) \tag{3-2}$$

Rewriting this formula and letting

$$K = \frac{q}{\lambda} \tag{3-3}$$

we obtain the formula for t(Z):

$$t = t_0 + K (Z - Z_0) \tag{3-4}$$

where q is the quantity of heat (kcal/m^2-hr) flowing through 1 square meter of surface in an hour. Because this is stable heat flow, and relative to the well segment $Z - Z_0$ for which the calculation is being performed the heat reservoir area is very large, so that the area through which heat flows between Z_0 and Z can be considered approximately constant, we can assume that q is approximately constant; λ is the conductivity of the stratum (kcal/m·hr·deg), and for strata at the same level we can consider it to be constant. K is the stratigraphic thermal gradient (°C/meter), t_0 and t are the temperatures (°C) of a known point and the calculation point; Z_0 and Z are the depth of the known point and the calculation point (meters).

For a specific stratum we can consider q and λ to be approximately constant, so that K is also a constant. Accordingly formula (3-1)a is a straight line function.

Because the conductivity λ of rock is very small and the unit heat flux q is much larger than for an ordinary stratum, the temperature gradient K of the cap rock is rather large. A high temperature gradient is a characteristic of cap rock.

B. Convective Strata

The pores and fissures in convective strata are full of fluid. In general, because of the natural convection of hot water, the upper and lower parts of a given stratum have rather uniform temperature, which is to say that the temperature gradient $K = dt/dZ$ approaches zero. This is the general characteristic of convective strata.

The function $t(Z)$ is a straight line function:

$$t = \text{const.} \qquad (3\text{-}1)\text{b}$$

However, when there is entering cold water, the temperature law for the transition zone in which cold water and hot water are in contact is relatively complex. It is affected not only by the position of entry of the cold water and the runoff flow rate, but also by the degree of fissuring of the stratum, and it is difficult to propose a precise and general formula: we can only use approximate methods. We used a trapezoidal approximation approach, using the straight-line function (3-1)a to give approximately the function $t(Z)$ for the transitional zone. This may involve a rather large error in the transition zone, but because its thickness is much less than the depth of the well, the error can be neglected in engineering calculations regarding depth-averaged specific gravity and stratigraphic temperature gradient.

To sum up the foregoing, for both conductive and convective layers the function $t(Z)$ of a simple stratum can be expressed by the formula

$$t = t_0 + K\,(Z - Z_0) \qquad (3\text{-}1)\text{a}$$

For conductive cap rock and convective transitional zones, K will be rather large and will be positive for temperature increasing with depth and negative for decreasing temperature; for most reservoirs K is close to zero.

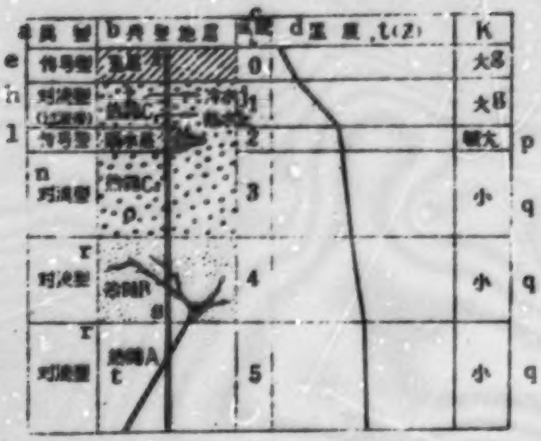


Figure 1. The different characteristics of the function t(Z) and the pressure gradient K indicate that: reservoir C_1 is affected by cold water runoff and is a transition zone; collector C_2 is not affected by cold water runoff or is only slightly affected; C_1 and C_2 are both gravel reservoirs; reservoir B is a silica sandstone reservoir; and reservoir A is a deep fissured reservoir.

Key:
a. category
b. typical stratum
c. zone number
d. temperature, t(Z)
e. conductive
f. cover layer
g. large
h. convective (transition zone)
i. Reservoir C_1
j. cold water
k. hot water
l. conductive
m. water-impermeable stratum
n. convective
o. Reservoir C_2
p. relatively large
q. small
r. convective
s. Reservoir B
t. Reservoir A

Figure 1 shows the characteristics of the function t(Z) and the thermal gradient for typical strata. The graph of these characteristics is useful when using well temperature data to determine the true temperature of the heat reservoir. Because the temperature curve for the well interior reflects the temperature of the fluid in the well (and not that in the stratum), if no analysis is made and the well temperature is taken as the reservoir temperature, the error may be very large. If in the reservoir section of the well effects are produced by cyclic cooling by the mud and vertical heat convection, the temperature inside the well or the temperature of the stratum near the well wall will be lower than the true temperature of the heat reservoir; moreover, in a well section in a layer impermeable to water or in a cover stratum, owing to gushing or vertical heat convection, the temperature inside the well may be much greater than the true temperature of the stratum itself, a phenomenon which is especially apparent in the section near the reservoir. Accordingly, in order to minimize the difference between temperature measurement data and the reservoir temperature, before taking temperature readings there must be a thorough purging (generally at least 24 hours), and the temperature must be read immediately after closing off the well. Moreover, for fissured reservoirs, temperature data in the fissured area is the best indication of the true reservoir temperature.

4. The Relationship Between the Specific Gravity and Temperature of Water

The formula expressing the relationship between the specific gravity and the temperature of pure water can be obtained from saturated steam tables.[4] For convenience in calculating stratigraphic temperature gradient formulas, we use an approximate calculating formula:

$$r_W' = 1.020 - 0.040 \cdot 10^{-2} t = 0.020 \cdot 10^{-4} t^2 \qquad (4\text{-}1)$$

where t is the temperature (°C) and r_W' is the specific gravity of pure water.

The relative error ε of approximate formula (4-1) is:

not greater than 1.10 percent when t = 40-300°C;
not greater than 0.6 percent when t = 10-280°C;
not greater than 0.35 percent when t = 80-200°C.

These errors have no effect at all on engineering calculations of the stratigraphic pressure gradient.

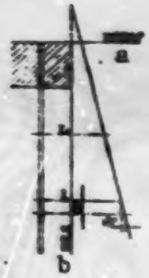
A real geothermal fluid will contain large quantities of soluble minerals and suspended microscopic particles, and accordingly the specific gravity will be greater than for pure water. In the thermal fluid of the Yangbajing Geothermal Field the level of dissolved minerals is rather low, and the increase in specific gravity resulting from the solid phase can be taken as 0.01 - 0.02. In blowout prevention calculations, we generally use the higher value (0.02). Accordingly, the specific gravity of the thermal fluid in the Yangbajing field is:

$$r_W = 1.04 - 0.04 \times 10^{-2} t - 0.02 \times 10^{-4} t^2 \qquad (4\text{-}2)$$

5. The Stratigraphic Pressure Gradient as a Function of Depth in the Yangbajing Field

Here we only discuss the pressure gradient laws for a liquid within the reservoir. According to Figure 2, when the differential increase corresponding to any well depth is dZ, the increase in the stratigraphic pressure is:

$$dP = 0.1 r_W \cdot dZ \qquad (5\text{-}1)$$



key: a. stratigraphic pressure P
b. depth Z

Figure 2. Stratigraphic pressure calculation chart

According to formula (3-1)a, we obtain dZ = 1/Kdt. We then substitute the values from equation (4-2). After integration and application of the following initial conditions:

$$t = t_0 \text{ and } P = P_0 \text{ when } Z = Z_0,$$

we obtain the following integral formula:

$$\frac{10(P-P0)}{Z - Z_0} = 1.04 - 0.04 \times \frac{t_0 + t}{2} \times 10^{-2} - 0.02 \times \frac{t_0^2 + t_0 t + t^2}{3} \times 10^{-4} \qquad (5\text{-}2)$$

It can be shown that when the temperature t_0 inside the well is between 120° and 370°C, the calculation error resulting from replacement of the term $\frac{t^2 + t_0 t + t^2}{3}$ in formula (5-2) by $\left(\frac{t_0 + t}{2}\right)^2$ is less than 0.5 percent. Then, letting

$$T = \frac{t_0 + t}{2} \times 10^{-2} \qquad (5\text{-}3)$$

we can simplify formula (5-2) to:

$$\frac{10(P - P_0)}{Z - Z_0} = 1.04 - 0.04T - 0.02\, T^2 \qquad (5\text{-}2)a$$

The term $\frac{10(P - P_0)}{Z - Z_0}$ on the left side of formula (5-2) is actually the specific gravity averaged over depth of the hot water in the well section between Z_0 and Z, and if we replace it by r_{Wa}:

$$r_{Wa} = \frac{10(P - P_0)}{Z - Z_0} \qquad (5\text{-}4)$$

then $$r_{Wa} = 1.04 - 0.04T = 0.02T^2 \qquad (5\text{-}5)$$

In order to derive the stratigraphic pressure P at depth Z, we have only to convert equation (5-4):

$$P = 0.1\, [(10P_0 - r_{Wa} Z_0) + r_{Wa} Z].$$

if we let: $$\Delta H = 10\, P_0\, r_{Wa} Z_0 \qquad (5\text{-}6)$$

then $$P = 0.1\, (\Delta H + r_{Wa} Z) \qquad (5\text{-}7)$$

In the above formulas, P_0 is the stratigraphic pressure (kg/cm^2) within the reservoir at the known depth Z_0 (meters); Z_0 is the depth of the known point (meters); P is the stratigraphic pressure at the calculation point Z (kg/cm^2); Z is the depth of the calculation point (meters); ΔH_0 is the pressure constant (in meters of a water column); r_{Wa} is the specific gravity averaged over depth of the hot water between dephts Z_0 and Z of the well section in the reservoir; and T is 1/100 the average temperature in the well section from Z_0 to Z.

Below, we discuss the depth-averaged specific gravity r_{Wa} and the pressure constant ΔH_0 of formula (5-7).

A. The Depth-Averaged Specific Gravity

We can see from equation (5-5) that the depth-averaged specific gravity between Z_0 and Z is related only to the average temperature divided by 100 in that section. We know from the discussion of the function t(Z) that for most reservoirs (convective strata), t is almost invariant with depth (with the exception only of transition zones which cold water is entering), and accordingly there is no necessary connection between the depth-averaged specific gravity and the depth. It is very important to recognize this fact, because it can greatly simplify the calculation of the depth-averaged specific gravity.

The above discussion was for single-stratum conditions. If one well passes through several reservoirs with different temperature gradients K or different temperatures, as in Figure 1, and if the known point Z_0 and the calculation point Z are in different reservoirs, we must first use equation (5-5) to find the depth-averaged specific gravities for the individual sections separately, before we can derive the average value.

It should be pointed out that for ordinary cold water wells, the calculation is much simpler, since we can take r_{Wa} equal to 1.0.

B. The Pressure Constant

The physical significance of the pressure constant can be seen from formula (5-6) and Figure 3. It is equivalent to the height of the pressure head above the surface of the wellhead. This is a very useful constant which gives a well's pressure-bearing state.

The pressure constant is almost independent of well depth, and accordingly using it to describe the pressure-bearing state of a well is more universal than using the stratigraphic pressure or the pressure gradient, because separated from well depth conditions the latter two quantities are meaningless.

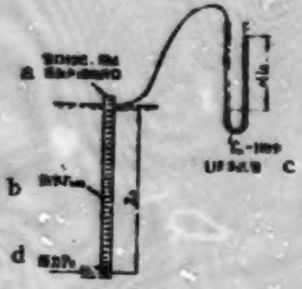


Figure 3. Physical significance of the pressure constant ΔH_0. A tube filled with hot water of average specific gravity r_{Wa} and its top sealed simulates a well with closed wellhead. The height to which the fluid in the manometer (specific gravity 1) rises (height of pressure head) is equivalent to the pressure constant ΔH_0.

Key:
a. tube opening sealed; simulates well with closed wellhead
b. hot water (r_{Wa})
c. U-tube manometer, water with $r_W = 1$
d. pressure P_0

The depth-averaged specific gravity and pressure constants for certain wells in shallow reservoirs in the Yangbajing field are shown in Table 2.

Table 2. Pressure Parameters of Some Wells in the Yangbajing Field

井号 a	深度 米 b	井口海拔高程 h, 米 c	热水平均比重 γ_{wa} d	压力常数 ΔH_0, 米水柱 e	零压点超高 Δh_0, 米 f	零压点海拔高度 h_0, 米 g	备注 h
1	41	4233.2	0.95	7.0	7.37	4240.6	估算值 i
2	71.05	4234.7	0.94	9.0	9.57	4244.3	估算值 i
3	311.21	4283.8	0.95	6.0	6.33	4290.2	估算值 i
4	68.42	4281.8	0.90	8.5	9.45	4291.3	
5	457.28	4297.3	0.96	7.9	8.23	4305.4	
6 A	254.70	4284.1	0.92	24.1	26.2	4310.3	
7	682.78	4279.7	0.95	15.0	15.8	4295.5	
9	87.25	4297.0	0.88	14.3	16.3	4313.3	
13	200.54	4333.7	0.93	−16.7	−18.1	4315.6	

Key:
a. well number
b. depth, meters
c. wellhead elevation above sea level h, meters
d. depth-averaged specific gravity of hot water, γ_{wa}
e. pressure constant ΔH_0, meters of water column
f. excess altitude of zero-pressure point Δh_0, meters
g. zero-pressure point elevation above sea level h_0, meters
h. remarks
i. estimated

Methods of determining the location of the pressure constant:

One of the methods given below can be used to determine the pressure constant ΔH_0; the methods can be used for determinations under different circumstances. It is best to make determinations using several methods for mutual verification.

(1) Actual Pressure Determination Method

After a well which has been thoroughly blown out is closed, a downhole manometer is used at some depth Z_0 inside the reservoir to determine the pressure P_0 inside the well, after which the calculation is made with equation (5-6).

It must be pointed out that only pressure determinations made inside the reservoir can be used for this calculation. To make the reading be as close as possible to the real pressure, it is best to lower the pressure sensor to a location where the fluid passages are relatively good, for example a porous stratum with rather large fissures or permeability.

(2) Balancing Mud Density Method

When balancing occurs in the well drilling process, the specific gravity of the drilling mud can be finely adjusted so that the pressure of the mud column and the stratigraphic pressure balance each other; the mud specific gravity r_0 at the time of equilibrium and the bubbling or infiltration location Z_0 are recorded, and the pressure constant is calculated according to the following formula:

$$\Delta H_0 = (r_0 - r_{Wa})\, Z_0 \qquad \text{(5-6)a}$$

(3) Wellhead Back Pressure Method

When the location of a bubbling of infiltration stratum cannot be determined, this method may be used. This method too is used when the pressure coefficient ΔH_0 is positive. It can be used to determine simultaneously the position Z_0 of bubbling or infiltration and the stratigraphic pressure P_0.

The well is pressurized with two kinds of muds with specific gravities r_1 and r_2 which are both lower than that required to balance the stratigraphic pressure, and the casing pressures P_{C1} and P_{C2} for the closed well are determined separately, after which P_0 and Z_0 are calculated by the following formulas:

since $$P_0 = P_{C1} + 0.1\, r_1 Z_0$$

and $$P_0 = P_{C2} + 0.1\, r_2 Z_0$$

accordingly, $$Z_0 = \frac{10(P_{C1} - P_{C2})}{r_2 - r_1} \qquad \text{(5-8)}$$

By substituting Z_0 into any one of the formulas above, P_0 can be obtained. The value of ΔH_0 is then calculated by formula (5-6) using the values of Z_0 and P_0.

(4) Water Level Depth Method

This method is used when there is a low pressure gradient, i.e., when the pressure constant ΔH_0 is negative.

Cold water is introduced into the well, and the static water level Z_1 is determined, after which the stratigraphic pressure P_0 can be calculated from the following formula:

$$P_0 = 0.1\, r_W\, (Z_0 - Z_1) \tag{5-9}$$

where $r_W = 1$, the specific gravity of the cold water. The value of ΔH_0 can be calculated from equation (5-6) using Z_0 and P_0.

If the water infiltration level Z_0 cannot be determined, two thin muds (specific gravity not greater than 1.10) with different specific gravities r_1 and r_2, or plain water, can be introduced into the well, and the static level Z_1 and Z_0 determined, after which Z_0 can be calculated from equation (5-10):

since $$P_0 = 0.1\, r_1 (Z_0 - Z_1)$$

and $$P_0 = 0.1\, r_2 (Z_0 - Z_2)$$

accordingly $$Z_0 = \frac{r_1 Z_1 - r_2 Z_2}{r_1 - r_2} \tag{5-10}$$

It is easy to find P_0 from Z_0, after which ΔH_0 can be found from equation (5-6).

Below we derive formulas for the stratigraphic pressure gradient and the equivalent specific gravity.

If we substitute the value of P from equation (5-7) into the pressure gradient formula and the equivalent specific gravity formula, we obtain:

$$G = 0.1 \left(r_{Wa} + \frac{\Delta H_0}{Z} \right) \tag{5-11}$$

and $$r_b = r_{Wa} + \frac{\Delta H_0}{Z} \tag{t-12}$$

where G is the geothermal pressure gradient and r_b is the stratigraphic pressure equivalent specific gravity. Moreover, $r_b = 10G$. G and r_b have similar forms, and accordingly because of limited space we will discuss only r_b.

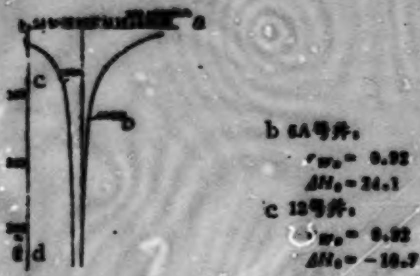


Figure 4. Curves of rb(Z) for wells 6A and 13, Yangbajing field

Key:

a. (illegible)	c. Well 13
b. Well 6A	d. depth, meters

The curve for the stratigraphic pressure equivalent specific gravity for wells Nos 6A and 13 of the Yangbajing field, determined from equation (5-12), are shown in Figure 4. Well 6A is a well with a positive pressure constant, and well 13 has a negative pressure constant. The curves for the two wells have different directions of curvature.

6. The Surface Patterns of the Stratigraphic Pressure Gradient and the Zero-Pressure Surface Contour Map for the Yangbajing Field

When choosing a well drilling process for new well sites and determining the surface distribution of the reservoir, it is necessary to understand the variation of the pressure gradient over the surface coordinates of the well locations, i.e., the surface distribution law.

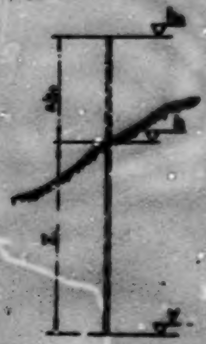


Figure 5. Relationship of depth coordinate to elevation coordinate

For ease in comparing the parameters for different well locations, here we use the elevation above sea level instead of the depth as previously. If we let the elevation be y at a location with depth Z, the wellhead elevation is h, as in Figure 5, we obtain:

$$Z = h - y \tag{6-1}$$

and substituting into equation (5-7) we obtain

$$P = 0.1\ [\Delta H_0 + r_W a(h - y)] \tag{6-2}$$

According to equation (6-2) there must exist some elevation above sea level h_0 at which the stratigraphic pressure P is equal to zero: $y = h_0$, $P = 0$; substituting into equation (6-2) we obtain

$$h_0 = h + \frac{\Delta H_0}{r_{Wa}} \tag{6-3}$$

and if we let $$\Delta h_0 = ho - h \tag{6-4}$$

we obtain $$\Delta h_0 = \frac{\Delta H_0}{r_{Wa}} \tag{6-5}$$

where h_0 is the elevation in meters at the zero-pressure point, and Δh_0 is the difference in elevation between the zero-pressure point and the wellhead topography, and is called the excess altitude of the zero point.

The sea level elevation h_0 of the zero-pressure point indicates the magnitude of the potential energy of the fluid; the excess altitude of the zero-pressure point Δh_0 is similar to the pressure constant ΔH_0 in giving a well's pressure bearing characteristics, but ΔH_0 is in pressure units expressed as the height of a water column, while Δh_0 is in geometric units. The value of h_0 is determined only by reservoir characteristics, while ΔH_0 and Δh_0 are related not only to reservoir characteristics but also to the terrain elevation. With identical h_0F, the greater the elevation of the wellhead, the smaller ΔH_0 and Δh_0, which completely explains why wells drilled in the northern part of the Yangbajing field are likely to infiltrate, while in the southern part they are likely to gush.

By connecting a series of zero-pressure points we can form a zero-pressure surface. In order to express this zero-pressure surface on a flat diagram, we use the contour method, and call a map of this kind a zero-pressure contour map. Figure 6 is a zero-pressure contour map for shallow reservoirs in the Yangbajing field based on the zero-pressure point elevations of existing wells.

The characteristics of some of the wells in the Yangbajing field are shown in Table 2.

Below we given an example to explain the use of the zero-pressure contour map.

If the surface position and wellhead altitude of well B which is about to be drilled is h = 4288 meters (see Figure 6), determine the specific gravity of the mud needed to balance the stratigraphic pressure in that well.

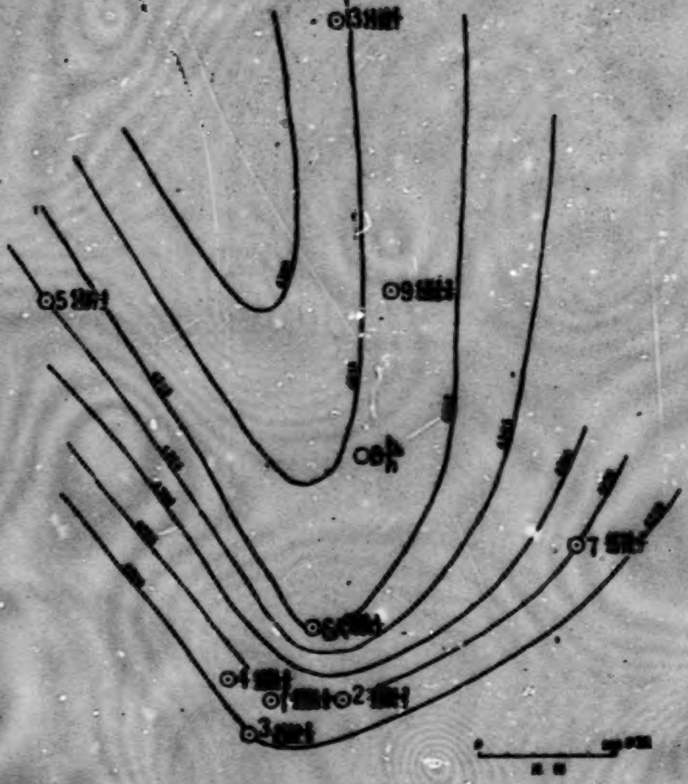


Figure 6. Zero-pressure surface contours for shallow reservoirs on Yangbajing field

Key: Large number beside well symbol is well number, numerator is zero-pressure point elevation, denominator is wellhead elevation.

Answer: First we show the surface coordinates position of well B on the zero-pressure map (Figure 6), and read from the map the zero-pressure altitude h_0, which is 4314 meters. Thus the excess elevation of the zero-pressure point is $\Delta h_0 = h_0 - h = 26$ meters.

On the basis of temperature data from well B, we can use formula (5-5) to calculate the depth-averaged specific gravity r_{Wa}. If the temperature is unknown, we can determine it approximately from the known depth-averaged specific gravities of wells in the vicinity of well B (such as 6A and 9), obtaining $r_{Wa} = 0.92$.

We obtain the pressure constant from equation (6-5): $\Delta H_0 = r_{Wa} \cdot \Delta h_0 = 29.9$ meters water column. From equation (5-12), the relationship of the stratigraphic pressure equivalent specific gravity r_b and the depth for well B is:

$$r_b = r_{Wa} + \frac{\Delta H_0}{Z} = 0.92 + \frac{23.9}{Z}$$

In order to prevent gushing, the correct mud specific gravity r_m should be greater than r_b 0.02 - 0.04; if we choose 0.02, then

$$r_m = 0.94 + \frac{23.9}{Z}$$

We can see from this equation that the specific gravity of the mud should be gradually decreased as the well becomes deeper. The maximum specific gravity is determined by the depth at which the top of the shallow reservoir is located; for example, if the depth of the reservoir Z is 30 meters, then the specific gravity of the mud used at the beginning of drilling should be:

$$r_m = 0.94 + \frac{23.9}{Z} = 1.74$$

7. Use in the Drilling Process

Here we will give a simple description of the use of the pressure gradient law in the problems described in section 1; a complete description is not the purpose of the present article.

A. Estimation of the Pressure Bearing State of the Shallow Reservoirs in the Yangbajing Field

A high-pressure constant indicates that the well is likely to gush, while in the reverse case it is likely to infiltrate. Accordingly, the potential for gushing (or infiltration) can be quantitatively estimated by means of the pressure constant ΔH_0. We can see from Table 2 and Figure 6 that the value of ΔH_0 for the southeast portion of the field is higher than that for the northwest part, and on the mountain slope north of Zhongni Highway ΔH_0 even becomes negative. Accordingly, wells drilled in the southeastern section are likely to gush, while those drilled in the northwestern section are likely to infiltrate; in addition, we can also see that in the vicinity of a line connecting wells 2 and 6A, the pressure constant is rather high, and the farther away to the side one moves from the line between, the lower ΔH_0 becomes.

The area with high pressure constant values is in the vicinity of well 6A, and the maximum value is 24.1 meters (water column). On the basis of this datum, we are justified in believing that the stable wellhead pressure value for wells drilled into the shallow reservoirs in the Yangbajing field that have been closed cannot exceed 2.5 kg/cm^2. It is easy to calculate from equation (5-12) that for these wells (with a reservoir depth Z generally about 30 meters), we can control the stratigraphic pressure with a mud with a specific gravity of about 1.75 and prevent gushing. This completely answers the first question that was posed in section 1. Actual results have corroborated this conclusion.

B. Selection of Well Suppression Method

Geothermal wells have a rather high temperature, and the literature of many countries has reported the use of pressurized cold water cooling as a means of controlling gushing. This method was also used in the initial period of drilling in Yangbajing. But under many conditions the method was ineffective. Analysis and calculations of the stratigraphic pressure gradient helped us to understand the essence of the phenomenon. We believe that the essence of cold water control depends on whether or not the pressure gradient of the cold water column can exceed the stratigraphic pressure gradient. This means that only when the stratigraphic pressure gradient equivalent specific gravity is less than the specific gravity of cold water can the pressurized cold water method achieve results. Otherwise, it is necessary to use the mud well suppression method or stay with the drill rod suppression method or the capping suppression method.

Here we must point out that gushing and infiltration are two expressions of the same essence: the former is violent and the latter gradual. In general when the wellhead excess pressure is maintained below 0.5 kg/cm^2 it is the latter form that occurs. For some wells with rather low pressure constants (but larger than zero), if a sufficient amount of continuous cold water injection is used to maintain the liquid column pressure steady, a relatively low wellhead excess pressure can be maintained in a constant state, at which time the goal of prolonged bubbling but no gushing can be achieved. But this "well suppression" is incomplete.

C. Selection of the Length of the Uncased Bottom Hole and the Position of the Casing Point

We can see from formula 5-12 that when the pressure constant ΔH_0 is positive, the stratigraphic pressure equivalent specific gravity r_b decreases hyperbolically as the depth Z increases. The shallower the well, the more rapidly it drops off. Accordingly, when the length of the uncased bottom hole is too great, the difference in the mud specific gravities required at the two ends of the uncased section is increased, with a high specific gravity required at the top and a low specific gravity required at the bottom, so that it is difficult to use a mud with one specific gravity to satisfy the two different requirements. This is the reason why geothermal wells are extremely likely to show upward gushing above and downward infiltration below. This phenomenon is even more pronounced when drilling into shallow strata. The method of overcoming it is to select the location to which the casing penetrates in accordance with the infiltration suppression pressure gradient and the stratigraphic pressure gradient, to control the length of the uncased bottom hole, and at the same time to use an infiltration plugging method. In addition, the mud specific gravity should be correctly calculated for different depths.

D. Selection of a Method of Inducing Gushing

The pressure gradient data are straightforward indications of the degree of difficulty of inducing gushing of a well after it has been completed. Wells with a pressure gradient greater than 0.1 can conveniently be induced to gush by decreasing the mud specific gravity; those with a gradient less than 0.1 can only be induced to gush by gas lift or pumping of water. Some wells in which the pressure gradient is close to that of plain water can be induced to gush by the "heating effect," which consists of introducing plain water and waiting for it to become heated, when its specific gravity will decrease, thus inducing gushing. The stratigraphic pressure gradient data are very useful in selecting and calculating the above flow-inducing methods.

In other countries the heating effect method after introduction of cold water is extensively used for high temperature geothermal wells with temperatures between 200° and 300°. But it must be seriously pointed out that this method is generally useless for certain negative-pressure-constant wells with a temperature below 200° and with cold water runoff in the shallowly buried section. Under these latter circumstances, the saturation pressure of the hot fluid is rather low, and there is no way of overcoming the pressure of the water column (with a rather low temperature) in the well.

E. Selecting the Drilling Fluid

In order to control gushing, prevent infiltration, and also to prevent the reservoir from becoming clogged, the best approach is to use the pressure balancing method of drilling. The stratigraphic pressure gradient data are useful in selecting the kind of drilling fluid to be used. In general, when the stratigraphic pressure equivalent specific gravity is equal to or greater than the specific gravity of plain water, plain water or a drilling fluid of the appropriate specific gravity can be used to drill the well, but when the equivalent specific gravity is less than that of plain water, foam, fog or air can be selected for drilling, depending on the magnitude of the equivalent specific gravity. The low specific gravity fluid method of well drilling is promising for wells in the northwestern part of the Yangbajing field and in wells whose deeper sections have low pressure gradients.

8. Conclusions

A. The stratigraphic classification used for oil or gas wells should not be used to classify strata of geothermal fields. This article proposes an approach to pressure classification.

B. The relationship between the stratigraphic pressure gradient of a geothermal field and depth can be described by a hyperbolic function. In the shallow section, the parabolic curve changes steeply, while in the deep section it slopes more gently. Accordingly particular care must be taken when drilling into shallow reservoirs.

C. The direction of curvature for wells with positive and negative pressure coefficients are opposite, but they all have the depth-averaged specific gravity of the heat fluid as their limit.

D. A method of drawing a zero-pressure surface contour map is proposed. It is helpful in estimating the stratigraphic pressure gradient situation at different surface positions.

Afterword

Although this article is intended to apply to high-temperature moist steam geothermal fields, its principles are also applicable to hot spring wells, cold water wells, exploratory drilling in solid mines and other engineering drilling exploration. Under these conditions, because the temperature is rather low, (for the most part normal) the depth-averaged specific gravity of water r_{Wa} can be taken as 1.0, so that the various calculations become much simpler.

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HAJIF-1 AIRCRAFT STRUCTURAL ANALYSIS SYSTEM DESCRIBED

Beijing GUOJI HANGKONG [INTERNATIONAL AVIATION] in Chinese No 2, 5 Feb 80 pp 2-4

[Article by Aircraft Structural Analysis System Development Group: "Brief Introduction to the HAJIF-1 Aircraft Structural Analysis System"]

[Text] The HAJIF-1 (Hangkong Jiegou Fenxi Xitong 1) Aircraft Structural Analysis System is a large-scale general-use set of finite element structural analysis computer programs independently developed by our country. A study lasting 10 months has shown the system's operation to be satisfactory, so that it is now ready for formal use.

Back in the late 1950's, our country began to use computers for stress and deformation analysis of aircraft structures. At the time, a displacement method using beams and torsion resistance boxes was used. In the early 1960's a standardized program was developed using a direct stiffness method and substructure techniques. Starting in the 1970's, the limited-element method was used to develop many specialized and general programs for use in structural analysis and summarization. In 1976, the China Aviation Research Institute (CAE) decided to bring together groups belonging to four of its research institutes in a special development group in order to begin development of a large-scale general structural analysis system; it started by developing the HAJIF-1 linear static analysis section.

Design Approach

In order to make the new system easier to use, more efficient and broader in application than previous structural analysis programs, the development work concentrated on automatic generation of starting data, a special user-oriented structural analysis language, and a highly efficient, high-order sparse matrix analysis method. The specifics of the design approach include:

1. Generality of application. A multilevel substructure analysis technique was used, making it possible to analyze any type of large-scale complex structure.

2. Flexibility. We used a user-oriented structural analysis language which could carry out 15 fixed routines contained in the system and could also utilize specially-defined operations written by the user.

3. High efficiency. The system features specialized data statements and automatic generation of starting data, and offers the user two alternative solution methods.

4. Expandability and ease of revision. The system has a modular structure, so that to revise or add new capabilities it is only necessary to revise or add the relevant module, without altering any other modules.

5. Interrupt and diagnostic features. The system has an interrupt processing capability, a step-through capability, and can restart after a present interrupt is found. It has a certain error diagnosis capability, and it can emit a warning signal or stop operation depending on the nature of the error.

6. Easy machine interchangeability. With the exception of a small part of the program which is written in assembly language, the program is written in FORTRAN IV, which makes it easy to use it on computers of different types.

System Capabilities

The HAJIF-1 system can carry out linear deformation and stress analysis of thin-walled structures, crossbeam frames and framed girders under external load, and will soon have the additional capability of analyzing three-dimensional continuous elastic bodies. There are no limitations on the types of problems that can be solved. But because the computer on which it is currently being used has a relatively small memory (256 Kbyte) and is rather slow (fewer than 100,000 operations per second in double-precision floating point arithmetic), the scale of the problems is limited to a maximum of 10 substructure levels, and a maximum of 99 individual substructures, with no more than 3,000 degrees of freedom for each substructure and no more than 6 degrees of freedom for each node. The system has 30,000 FORTRAN and assembly language statements.

The system offers 15 fixed routines, including triangularization analysis, displacement, stress analysis and influence number calculation based on assembly of a stiffness matrix; triangularization analysis, displacement, stress analysis and influence number calculation based on assembly of a boundary stiffness matrix; displacement; stress calculations; influence number computation, and the like.

The system's elements store contains 18 elements including various rod elements, beam elements, plate elements, thin surface elements and rigid elements. The materials store contains 7 materials, including LY12 (plate and shaped stock), LC4 (plate and shaped stock), 30CrMnSiA, 30CrMnSiNi2A and 1Cr18Ni9Ti.

Mechanics Design of the System

The HAJIF-1 system divides the nodal degrees of freedom into five types: degrees of freedom of nodes within substructures; degrees of freedom of nodes at substructure boundaries; degrees of freedom at moving boundaries, primarily used when the generalized displacement in the direction of one degree of freedom is a fixed value; permanently fixed degrees of freedom, primarily providing constraints when eliminating motions of structural rigid bodies; and symmetrical and antisymmetrical degrees of freedom, primarily used in symmetricity treatment of structures.

The HAJIF-1 system provides five rectangular coordinate systems: substructure coordinate systems; element coordinate systems; nodal coordinates, primarily used in eliminating abnormal states arising from the formulas as a result of very low strength in the direction of one of the degrees of freedom; assembly coordinates, principally used in providing parameters for standard-geometry assemblies of structures and automatic generation of the calculation model grid; and structure coordinates, which function as common reference numbers for all of the structures.

The basic steps of the solution by HAJIF-1 are: assembly of the substructure stiffness matrix, handling of constraint elements, substructure analysis, symmetry processing, interconnection of substructures, and multilevel substructure analysis, displacement, stress computation, and influence number computation.

System Mathematical Methods

In the static analysis, triangularization analysis of the stiffness matrix occupies the largest part of computation time. Accordingly the efficiency of the high-level sparse matrix solution method very strongly affects system efficiency. HAJIF-1 offers two solution methods which can handle sparse matrices of any width and are very efficient.

1. Automatic partitioning and effective column solution method, which uses two techniques to make it efficient. It avoids all empty operations which do not change the calculation results, and minimizes intermediate multiplication and addition results in the inner cycles; and depending on the size of the work area in the computer internal memory, it divides the columns of the matrix it contains into two types: those in the partitions, which are the principal columns, and those included among the effective columns, which are those whose influences must be calculated. During each step, only the elements needed for that step are entered into memory, which decreases the number of transfers between internal and external memory.

2. The superelement matrix analysis method, which simultaneously divides the stiffness matrix into many original level submatrices, and arranges these submatrices on the basis of their corresponding positions in the stiffness matrix so as to achieve a two-level direct-indexed matrix. If the order of the second-level address-indexed matrix is still too high, it can be further divided using the above method to obtain third-level addressed indices. This data organization method is relatively well suited to third-generation computers, and makes transfer of data in internal and external memory convenient and increases efficiency.

Program Organization

The HAJIF-1 program organization is on the two-level principle (Figure 1). The first level is the system individual capability modules, which are independent of each other, and merely carry out their individually specified functions, without being able to affect each other. The second level is the supervisor program, which is used to control the various functional modules, and to control the entire calculation and analysis process. The supervisor program is resident in main memory, while the various functional models are rolled in and out.

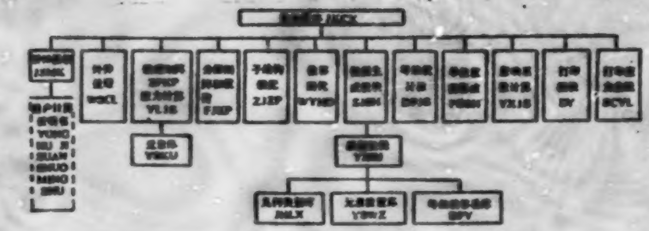

Figure 1. Overall structure of HAJIF-1

Key:
JKCX: Supervisor program
JSMK: Interpreter module
YONG HU...: User manual
WSCL: External processing
JPKP: Assemble stiffness matrix
YLJS: Stress computation
YSKU: Element store
FJKP: Analyze stiffness matrix and loads
ZJZP: Substructure assembly
WYHD: Displacement
SJSH: Data generation module
YXSJ: Initial shape data
JHLX: Geometrical shapes store
YSWZ: Element position store
DPY: Equivalent load displacement store
DPJS: Equivalent load computation
PDSH: Unit load formation
YXJS: Influence number computation
DY: Printout module
SCYL: Print stress curve

The system provides a user-oriented structural analysis language in order to adapt the multiplicity of structures and the different requirements of different users. This language consists of 92 statements which use Chinese romanization letters. The system interpreter module translates the initial program written by the user in the structural analysis language into a string of internal code which can be recognized by the system supervisor program. The supervisor program then organizes the computation process on the basis of the information contained in the internal code. In addition to the 15 above-mentioned routines provided by the system, the user also may use the structural analysis language to write his own subroutines, thereby meeting the need for flexibility.

Data Generation in the System

HAJIF-1 has a data generation module which can automatically generate the starting data, greatly simplifying the user's data preparation work. Data generation can be divided into external load calculation and structural data generation.

The task of external load computation is to assign the distributed aerodynamic forces and inertias equivalently over the structural mechanics model's nodal points and assure that the entire aircraft's external aerodynamic loads are in complete equilibrium with its inertial loads. HAJIF-1 can calculate the aerodynamic force distribution over the wings, tail and body on the basis of wind tunnel results or strength standards, can calculate the inertial force distribution, and of course can use loads specified by the operator.

The structural data generation module can, on the basis of user-specified control points and section lengths, automatically carry out a grid analysis of the standard geometric components: lines, curves, planes, curved surfaces, and form the corresponding nodal coordinates. The data generation module provides a total of 13 different geometric assembly shapes, including standard curvilinear segments, composite curvilinear segments, line segments, arc segments, parabolic segments, conic sections, parabolic sections, four-sided planar sections bounded by 4 composite curves, irregular nodal geometry component types and the like.

For element node information, the data generation model provides five element position generation statements.

For convenience in processing large quantities of data that continually reappear according to a specific pattern, the data generation model contains two constant difference data repetition statements and one data repetition statement. In summary, it can be seen that the various steps in HAJIF-1 from load calculation and structural data generation to calculation of structural deformation and stress distribution are connected into a whole, and accordingly they are convenient for the user and efficient.

An Example of System Utilization

After overall system debugging was completed, a total of 26 sample problem calculations were made. These problems ranged from small scale to large scale and from simple to complex, and finally a complete stress analysis of a certain aircraft was carried out. The entire body of the aircraft was divided into 20 substructures as shown in Figure 2. The largest substructure had 2,238 degrees of freedom, and the whole aircraft, with 27,446 elements, had 30,502 degrees of freedom. There were 9,188 input data cards. The multilevel substructure tree is shown in Figure 3.

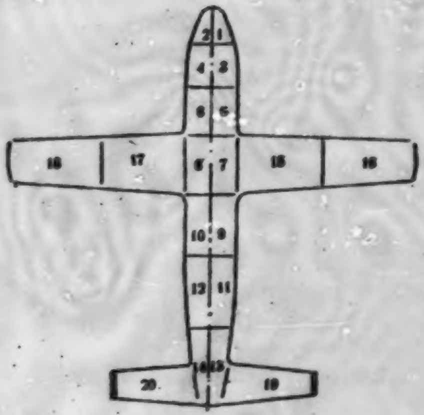

Figure 2. Substructures of a certain aircraft

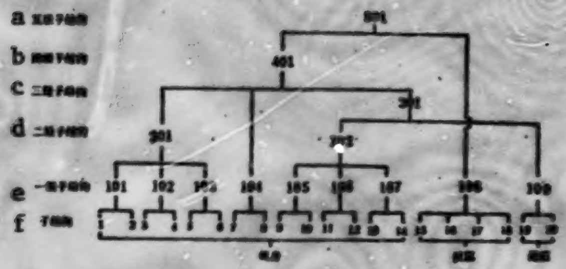

Figure 3. Multilevel substructure tree

Key:

a.	Fifth level substructures	d.	Second level substructures
b.	Fourth level substructures	e.	First level substructures
c.	Third level substructures	f.	Substructures

CWKZ(1)	Indicates performance of error diagnostics
SJSH	Data generation
KGSX	1/2, 3/4, 5/6, 7/8, 9/10, 11/12, 13/14, 15/16, 17/18, 101 (1, 2), 102 (3, 4), 103 (5, 6), 104 (7, 8), 105 (9, 10), 106 (11, 12), 107 (13, 14), 108 (15, 16, 17, 18), 109 (19, 20), 201 (101, 102, 103), 202 (105, 106, 107), 301 (202, 109), 401 (201, 301), 501 (401, 108). Tree structure for the calculation; 1/2 indicates that substructures 1 and 2 are symmetrical, and 102 (1, 2) indicates that first-level substructure 01 consists of substructures 1 and 2. The rest is analogous.
JL05	Fixed routine proceeding from assembly of stiffness matrix to stress computation.
DY	(Z01YSYL, 100; Z02YSYL, 101, Z03YSYL, 102, Z04YSYL, 103) Printout: stress on first substructure; element stress for second substructure with residual strength coefficient $\eta > 0.95$; element stress for third substructure where $\eta > 1.3$; stress, η, and nodal force on components of fourth substructure with maximum residual strength.
WAN	Program completed.

HAJIF-1's capabilities are limited to solving linear static problems at constant temperature. Such problems as dynamic analysis, stability analysis and linear influence analysis of materials and geometry will be solved in later versions of the structural analysis system. HAJIF-1 will be transferred to a larger and more modern computer.

Details of the aircraft structural analysis system can be found in the "Description of the Aircraft Structural Analysis System, Version 1 (HAJIF-1)," in the the "Aircraft Structural Analysis System Version 1 (HAJIF-1) User's Manual," and in a succession of articles which will appear in aviation journals and conferences on computational mechanics.

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CSO: 4008

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TITLE: "Supersonic Sail Wing"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 11, Nov 80 p 14

ABSTRACT: This article introduces a new wing design which can provide improved performance of a supersonic aircraft by utilizing favorable shock wave interference effects. In particular, the physics of shock wave formation over a wing during supersonic flight is explained. A specific sail wing design developed by the McDonnell Douglas Company is introduced and a tutorial discussion is presented to illustrate how the lift-to-drag ratio of the wing can be enhanced by taking advantage of the high pressure region below the wing surface which is created by an oblique shock wave emanating from the aircraft nose.

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TITLE: "Infrared Homing Guidance"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 11, Nov 80 pp 20-21

ABSTRACT: Infrared homing guidance is a passive guidance technique most commonly used on air-to-air missiles. It uses optical sensors which can seek targets that emit infrared radiation. In general, an infrared homing device employs the proportional navigation guidance scheme which steers the missile according to the measured angular rate of the line-of-sight rotation between the target and the missile. An infrared homing system has the following components: 1) optical system; 2) photo-sensitive detector; 3) signal voltage modulator; 4) electronic circuits; and 5) tracking mechanism. Current research efforts in infrared homing guidance are concentrated in the development of highly sensitive detectors, fast-response tracking mechanisms, and automatic search and track capability.

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TITLE: "High Altitude Simulation Test Platform for Aircraft Turbo Engines"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 11, Nov 80 pp 28-29

ABSTRACT: A high altitude simulation test platform is designed to create the pressure and temperature conditions of high altitude environment in order to test the performance of aircraft engines. Specifically, its functions are to: 1) certify and modify engine performance; 2) provide performance curves for airplane design; 3) eliminate engine troubles during flight; and 4) provide new data for high altitude engine research. In this article, the basic units of a high altitude simulation test platform are introduced and the simulation process of creating the stagnation temperature and pressure conditions of engine inlet and the static pressure condition of engine exhaust are explained. The key components of a test chamber which include the front chamber, the flow regulating screen, the inlet nozzle, the rear chamber, and the thrust measuring device are described.

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TITLE: "MATRA Super 530 Air-to Air Missile"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 11, Nov 80 pp 32-34

ABSTRACT: The MATRA Super 530 is a new French air-to-air missile to be equipped on the MIRAGE F-1 fighter airplane. It is designed specifically to intercept high altitude, high speed airplanes such as the MIG-25. The MATRA Super 530 was developed on the basis of its predecessor, the MATRA R530 missile and was first deployed by the French Air Force in December, 1979. The operation of a MATRA Super 530 missile can be either manually controlled with the aid of a fire control radar or automatically controlled by an on-board computer. The main advantages of the MATRA Super 530 missile are as follows: 1) good aerodynamic characteristics with high degree of mobility, stability, and high speed (Mach 4-5) capability; 2) highly sensitive guidance system with high-gain antenna, guidance computer and auto-pilot; 3) solid propellant engine to provide high thrust-to-weight ratio; 4) warhead with a kill radius of over 20 meters and a radio-controlled fusing device; 5) light-weight honey comb steel structure which can withstand high temperature created by aerodynamic heating.

3012
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TITLE: "Amelioration of Cadmium Soil in Changshi Irrigation Area and Prevention of Cadmium Contamination in Rice"

SOURCE: Beijing HUANJING KEXUE [ENVIRONMENTAL SCIENCE] Vol 1 No 5, 30 Oct 80 pp 7-11

ABSTRACT: The study on how to ameliorate the cadmium soil in the Zhangshi irrigation area of Shenyang, and prevent cadmium contamination in rice concludes that: 1) lime is the best amendment in terms of its neutralization of acidic soils, inhibition of rice absorption of cadmium from soils irrigated with acidic heavy metallic sewage, and economy; 2) pH is the main factor that affects rice absorption of cadmium,

[Continuation of HUANJING KEXUE Vol 1 No 5, 30 Oct 80, pp 7-11]

which drops against rising pH; and 3) rice absorption of cadmium is mainly at the later stage of growth, and therefore, more frequent irrigation at the earing stage is recommended for the prevention.

The authors express thanks to Vice-director Gao Zhengmin [7559 2163 3046] of the Institute, and Professor Yao Guigeng [1202 2981 5087] of Shenyang Agricultural College for reading and correcting the manuscript.

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TITLE: "Preliminary Study on Photochemical Smog Pollution at the Sigu District of Lanzhou"

SOURCE: Beijing HUANJING KEXUE [ENVIRONMENTAL SCIENCE] Vol 1 No 5, 30 Oct 80 pp 24-30

ABSTRACT: The study on the photochemical smog pollution over the Sigu district of Lanzhou shows that the frequency of such photochemical smog derived from nearby heavy and chemical industries can be higher than 35%, and the degree of pollution is indeed serious. The causes of such photochemical smog pollution is attributed to the strong solar radiation through the atmosphere that contains definite concentration of nitrogen oxides, crabohydrides and sulfur dioxide. Contrary to those at Los Angeles, the smog here is caused mainly by discharged waste gases from nearby industries.

The author expresses thanks to the Department of Environmental Chemistry of the Beijing University for direction and assistance, and to Prof. Tang Xiaoyen [0781 1321 3508] for reading the manuscript.

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TITLE: "Preparation of a Dispenser for Oil Spills"

SOURCE: Beijing HUANJING KEXUE [ENVIRONMENTAL SCIENCE] Vol 1 No 5, 30 Oct 80 pp 62-66, 47

ABSTRACT: Based on a study on the characteristics of HLB values and surface active agents in the compounding of highly efficient and low toxic oil spill dispensers, the author reports the preparation of two such preparations, with the adoption of such low toxic emulsifying agent as the ester type non-ionic surface active agent and paraffin hydrocarbon solvents. The HLB values for best emulsifying efficiency was found to be a tertiary compounding of EO(4), EO(11) and EO(6) oleats, but subject to the surface active agents composed of polyethylene oleate and polyethylene sorbitolate at appropriate proportions. The properties of the preparations with regard to their emulsifying power, biological toxicity, biological breaking, flash point and viscosity are finally evaluated.

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TITLE: "Application of High Gradient Magnetic Separation to Water Pollution Control"

SOURCE: Beijing HUANJING KEXUE [ENVIRONMENTAL SCIENCE] Vol 1 No 5, 30 Oct 80 pp 71-75

ABSTRACT: Advocating the advantages of the modern application of high gradient magnetic separation to water pollution control, the authors introduce the basic principles of the physical phenomenon of high gradient magnetic separation, the structure and separation of high gradient magnetic separators, and its application to the treatment of sewage from iron and steel industries, urban water works, and cleaning of drinking water. It is anticipated that adoption of superconductor technique will further increase the magnetic gradient, decrease power consumption, extend the separation range, and reduce cost, that water circulation will be further perfected, while river and lake pollution eliminated.

11,206
CSO: 4009

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TITLE: "Studies on Land Types in Mountain Regions North of Beijing"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 187-199

TEXT OF ENGLISH ABSTRACT: The mountain regions north of Beijing occupy the western part of Yan Shan which runs eastward to Shanhaiguan and forms the northern border of the North China Plain. The climate belongs to the semi-humid warm temperate type, with a cold winter and a hot summer. Average annual precipitation is about 800 mm in the front ranges and decreases to about 500 mm in the sheltered valleys. Deciduous forest of a semi-xerophytic type is the common vegetation. Drap soil is developed under this climatic and botanical environment.

Field investigations revealed that a great variety of landscape exists in this mountain region. A system of classification of land types has been attempted. This classification is based on the knowledge of physical geography and especially on the analysis of the physical factors controlling the differentiation of the landscape.

First, altitudinal zonation has to be considered. Although the altitude is not

[Continuation of DILI XUEBAO Vol 35 No 3, Sep 80 pp 187-199]

very high, from about 50 m in the foothills to over 2,000 m at the summit, vertical zonation of natural landscape is clearly manifested. Three vegetation-soil zones may be distinguished:
1. The lower part of the mountain, below 1,200 m, is covered by shrubs and grasses of semi-xerophytic and meso-xerophytic types. Small patches of Pinus tabulaeformis, Quercus dentala and Fraxinus bungeana may be found here and there in sheltered and protected areas. This is a secondary growth, the result of interference of human activities since historic times. Deprived of the protection of forest cover, erosion is very intensive on this part of the mountain. Mass wasting, such as mudflows, is a common feature which causes great damage to property and loss of life.
2. Above 1,200 m and up to 1,850 m is the second zone. It is rather well covered by a deciduous forest, dominated by various species of oak (Quercus aliena, Q. variabilis, Q. accussima), birch (Betula platyphylla, B. duhurica) and poplar (Popular davidiana). Shrubs and grasses form the undergrowth of the deciduous forest, but they are different species from those in the lower mountains. Brown forest soil is the typical soil. Due to the protection of the forest cover, mudflows seldom occur in this zone.
3. Above 1,850 m to the top of the mountain the deciduous forest is superseded by mountain meadow which is underlaid by a layer of black meadow soil. It constitutes a distinctive zone by itself. The meadow is used for pasture during the summer.

Next to altitudinal zonation, lithology deserves special attention. Lithological character is an important factor in the formation of landforms, soils and vegetation. For example, we found granite and limestone forming a very different landscape in this part of Yan Shan. Granite usually forms rounded or undulating landforms, covered with a thick layer of regolith and a mixed forest of pine and oak. Brown forest soil is developed wherever granite occurs. In limestone areas karstic landforms are found, with only a thin veneer of weather materials. Cypress (*Biota orientalis*) usually takes the place of pines. Drap soil is usually developed wherever limestone occurs. Loess which appears in different altitudes forms a typical landscape by itself, characterized by flat or undulating top and vertical slope under water erosion. The typical soil is drap soil, most of the loess-covered land being cleared for cultivation. Alluvial deposits along the valley constitute another type of landscape. The new deposits beside the river channel form flood plains, while the older deposits further away from the river form terraces. The flood plains and terraces are the most fertile land in the mountain region and become the center for agriculture and settlement. However, the occurrence of summer floods may be a hazard to the crops and inhabitants in the valley.

Mountain landscape is further diversified by the erosion of running water. Mountain slopes are intensively dissected and form mesorelief and microrelief. Slopes may be gentle or steep, convex or concave. The effect of aspects of slopes is also quite evident. In the upper part of the deciduous forest zone, south facing slopes are usually covered by shrubs and grasses and only the north facing slopes are forested with deciduous trees. In the lower mountain zone, the south facing slopes are

usually cleared for growing fruit trees while the north facing slopes are forested with pines.

Based upon the analysis mentioned above, the land units are organized into a hierarchy of descending size as follows:
Order I. (Land system or mestnostch), altitudinal zone with common type of climate, vegetation and soil, without regard to geological and geomorphic features. Lithological and geomorphic differences may form a sub-order within the zone.
Order II. (Facet or urochishche), a part of the altitudinal zone formed by grouping of different facies, having common mesorelief, rock materials, drainage, vegetation and soil.
Order III. (Facies or element), simplest unit of landscape, with homogeneous lithology, microrelief, drainage, microclimate, vegetation and soil.

All the units are recurrent in their distribution within the respective order. The individual units (local forms) are grouped into abstract forms (species) according to their homogeneity or similarity. Species of land units may be further grouped into association.

The procedure of mapping and classification of land units may proceed from lower order (smaller size) to higher order by grouping of the smaller units into larger units or, vice versa, by subdividing the larger units into smaller units.

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Mapping of land types was carried out on different scales. For the larger units, e.g., the land systems, a map on the scale of 1:200,000 has been produced. This is suitable for the use of the provincial authorities. For the facets, a map on the scale of 1:100,000 has been produced. This is intended for the use of the county. A few maps for distribution to land units of the lower order (facies) have also been prepared on the scale of 1:10,000. These may be used by the commune. It has been found that not all facies can be shown even on the scale of 1:10,000, so some facies have to be left out or combined.

In this report the abstract land units are described, with descriptions on area, distribution, landforms, water conditions, soil, vegetation and land utilization, which would be convenient for reference.

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TITLE: "Mulberry-Dyke--Fish-Pond on the Zhujiang Delta--A Complete Artificial Ecosystem of Land-Water Interaction"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 200-209

TEXT OF ENGLISH ABSTRACT: The "Mulberry-Dyke--Fish-Pond" system is a peculiar farming method developed by the working people as a result of making full use of land and water resources in their longtime farming practice in the Zhujiang Delta. It is an interrelated system which brings into full play the production potential and makes reasonable use of land-water resources. It promotes the development of different branches of agriculture and its related processing industry. "Mulberry-Dyke--Fish-Pond" is a complete scientific ecosystem.

Mulberry-Dyke--Fish-Pond is characterized by its complex and diversified cycle. Mulberry growing, sericulture and fish breeding are interrelated. They promote each other and their circulating operation is complex and diversified. In terms of the food chain, the whole operation follows the following pattern: mulberry leaves are fed to silkworms, silkworm excreta is fed to fish, and mud from the fishpond is used as good manure for mulberry trees. This circulating process begins with mulberry

growing, then moves on to sericulture and ends up with fish farming. In this closely related process, each link has either a positive or adverse effect on the others. There is a popular saying in Shunde which goes something like: The more luxuriant the mulberry trees, the stronger the silkworms, the fatter the fish, the richer the pond, the more fertile the dyke and the more the cocoons. This illustrates in full the circulation relation of Mulberry-Dyke--Fish-Pond. In this system the mulberry tree is the producer making use of sunlight energy to produce mulberry leaves, the silkworm is the first consumer eating mulberry leaves, the fish is the secondary consumer having silkworm excreta (and pupas) as food, and the plankton in the pond is the reduction agent bringing the organic substances, such as N, P and K, back to the pond.

The producing cycle of mulberry growing, sericulture and fish farming has as its base the circulation of substances in soil, water and living beings between the pond and dyke. The relations of mulberry trees, silkworms and fish to dyke, pond and atmosphere are those of substance-energy exchange and transformation between living beings and environment. Any change in morphology, productivity, quality, etc., during the growing process of mulberry trees, silkworms and fish is the result of interaction between mulberry trees, silkworms, fish and elements of the environment, such as temperature, light, water, air, soil, etc.

With an interdependent relationship between the living beings and environment, the Mulberry-Dyke--Fish-Pond is a complete ecosystem in which substance circulates and

energy is exchanged and transformed. It is a scientific farming method as well. In various cycles, big or small, the mulberry is the base and the fishpond is the key link. The pond can feed fish as well as the dyke. With the pond being taken good care of, there can be high yield in fish, and that also promotes the output of other crops.

The role of the Mulberry-Dyke--Fish-Pond is:

(1) Bringing into full play the potential of the local resources. Located in the southern subtropical zone, each year large quantities of mulberry leaves are collected, enough to feed eight to nine batches of silkworms, hence eight to nine batches of cocoons. Fish fry from the middle and lower parts of the Xijiang River are made use of in the development of pond fish farming. The river water and tidal water are made use of in self-control drainage and irrigation all year round. Mud from rivers and ponds is used as an important manure. Silkworm excreta is used to feed fish. Thus the land is being made full use of.

(2) Abundant sources of income and huge economic gains. The average income from every mu of mulberry trees (including that from mulberry leaves, cocoons, fish, vegetables, dry land crops and mulberry branches) is 400-500 yuan. If cocoons are exported, income will be increased, about four times that of rice, and three times that of sugarcane.

(3) A large labor force can be accomodated and is needed to do both heavy and light work.

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TITLE: "On Natural Zonation in Shaanxi Province"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 210-218

TEXT OF ENGLISH ABSTRACT: The division of natural zones is decided by the features of all round natural conditions. Since the formation of natural zones is mainly controlled by zonal factors, taking climatic conditions into consideration, heat, water, soil, vegetation and the characteristics in agricultural production should be regarded as criteria in the division of natural zones. Because these phenomena are mirrored in the soil, vegetation and agricultural differentiation, Shaanxi Province can be divided into the following eight natural zones:
(1) Sub-zone of semidesert steppe--brown desert steppe soil;
(2) Zone of dry steppe covered by wind-blown sands--light chestnut soil;
(3) Zone of dry steppe--light textured heilu soil;
(4) Zone of forest steppe--gray forest soil and argillaceous heilu soil;
(5) Zone of semi-arid deciduous broad-leaf forest and forest steppe--drab soil;
(6) Zone of mixed forest of coniferous and broad-leaf trees--turozem and drab soil;
(7) Zone of deciduous broad-leaf forest and evergreen broad-leaf forest--Cinnamon Yellow soil and Brown Yellow soil;

[Continuation of DILI XUEBAO Vol 35 No 3, Sep 80 pp 210-218]

(8) Sub-zone of evergreen broad-leaf forest--Yellow earth.
Of course clear boundary lines do not always exist since one natural zone may shade into another.

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TITLE: "On the Deterioration of Water Quality and Its Control After Large-Scale Reclamation in the Tarim Basin"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 219-231

TEXT OF ENGLISH ABSTRACT: The Tarim Basin below the confluence of the Yarkant, Hotan and Aksu Rivers has been one of our chief irrigated agricultural areas for the past 2,000 years, of which more than one million mu of virgin lands have been turned into farmland during the last 20 years. Such a large-scale land reclamation will certainly impinge on the natural environment of the basin, resulting in both favorable and unfavorable feedback, one of which is the deterioration of water quality.

Along the Tarim River, total dissolved salts which were chiefly composed of $SO_4 \cdot Cl \cdot HCO_3 - Na \cdot Ca \cdot Mg$ ions did not occupy more than one percent of the total water weight in the late 1950's and early 1960's. However, by the middle 1970's salinity had increased by five to eight times in the flowing water level period and chemical composition had changed into the Cl-Na type.

Groundwater in the newly reclaimed areas had undergone an even more conspicuous

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change. Before 1958, in a belt with a width of about 10 km along the Tarim River, the groundwater table was about 4-6 meters beneath the land surface in the upper and middle reaches and 3-8 meters in the lower reaches, while salinity of the groundwater did not rise above 1-3 g/l in general. However in 1973, after 15 years of cultivation, the groundwater table generally rose upward to 1-3 meters beneath the land surface and the salinity of the groundwater rose to 3-10 g/l, and even to 30-50 g/l in local depressions. Variations in groundwater tables and salt content also occurred in the adjacent non-reclaimed areas.

There can be only one conclusion. In view of protecting natural resources and meliorating water quality, we must henceforth make better use of water resources in the Tarim Basin and effective measures, based on and according to specific natural features in different areas, must be taken.

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TITLE: "Climatic Regionalization of Drought and Flood in Shandong Province"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 232-241

TEXT OF ENGLISH ABSTRACT: In the past, most of the climatic regionalizations in China only showed dry and humid degrees of the atmosphere. In this paper, surface data of 126 meteorological stations and 90 hydrological stations were used to discuss the climatic regionalization of drought and flood in Shandong Province. We introduce a concept of effective precipitation, utilizing precipitation, potential evaporation and surface runoff to denote a drought and flood index, $DW = E/P(1-\sigma)$. Here, E is the potential evaporation, P the precipitation, σ the surface runoff coefficient and $P(1-\sigma)$ the effective precipitation. According to this index, we can get a climatic regionalization of drought and flood but not a climatic regionalization of dry air and humidity.

Since this index has seasonal variations, we calculated the drought and flood index

[Continuation of DILI XUEBAO Vol 35 No 3, Sep 80 pp 232-241]

of four different seasons:

Spring (March, April, May) $DW_1 = 0.6E/P(1-\sigma)$
Early Summer (June) $DW_2 = 0.7E/P(1-\sigma)$
Mid-Summer (July, August) $DW_3 = E/P(1-\sigma)$
Autumn (September, October) $DW_4 = 0.7E/P(1-\sigma)$.

These calculating values are used as criteria dividing Shandong Province into 14 subdivisions.

The index of drought and flood is examined by the water budget and soil and actual drought and flood conditions. A table includes DW values of the index of drought and flood compared with actual drought and flood at Dezou Shi, Lin Xian and Ju Xian in 1963-1972. Classes of drought and flood in the table are taken as the following: DW value of 0.5 is a major flood, 0.51-0.75 a flood, 0.76-1.25 normal, 1.26-2.00 a drought, and DW value $>$ 2.00 a major drought. We found that the index DW defines the climatic regions of drought and flood rather well.

AUTHOR: DENG Yangxin [6772 7402 9515]

ORG: Lanzhou Institute of Glaciology and Cryopedology, Chinese Academy of Sciences

TITLE: "A Snow Avalanche in the Guxiang Region of Xizang and Its Role in the Physical Geographic Processes of High Mountains"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 242-250

TEXT OF ENGLISH ABSTRACT: During the investigations on the Guxiang mud-rock flow in Xizang from 1964 to 1965, we also observed the distribution, damage, types, activity and forms of snow avalanches and their roles in the physical geographic processes of high mountains.

The main contents in this paper are as follows:
1. The distribution and activity of snow avalanches.
2. The favorable conditions for snow avalanches.
3. The types of snow avalanches.
4. The role of snow avalanches in the physical geographic processes of high mountains:
(1) The geologic and geomorphologic functions of snow avalanches;
(2) The function of snow avalanches in the nourishment of glaciers;

[Continuation of DILI XUEBAO Vol 35 No 3, Sep 80 pp 242-250]

(3) The influence of snow avalanches on plant cover;
(4) The relationship between snow avalanches and mud-rock flow.
5. The influence of snow avalanches on constructional works in mountainous regions.

AUTHOR: WU Chen [0702 1820]

ORG: Geographical Institute of Hebei Province

TITLE: "Relationship of Water and Sand Eruption to Alluvial Sand Bodies in the Tangshan Earthquake Area"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese Vol 35 No 3, Sep 80 pp 251-258

TEXT OF ENGLISH ABSTRACT: During the great 1976 Tangshan earthquake with magnitude 7.8, a large-scale water and sand eruption occurred on the ground surface of Tangshan district. Based on field survey and aerial photo interpretation, it is evident that the spatial distribution of water and sand eruption, including the eruption density, morphological character and various extending orientations and their figurations, was associated not only with the sand bodies of macro-geomorphic units, but also with the micro-geomorphic types, especially the ancient river channels. Accordingly, we concluded that the distribution of water and sand eruption is controlled by alluvial sand bodies and the nature of water and sand eruption is determined by geomorphic types.

As for the occurrence of water and sand eruption, in addition to shock force with relevant energy, a thicker layer of shallow buried and water-saturated fine silt, which was covered or uncovered by clayey loam, is a necessary condition. Since

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some geomorphic types, such as river flood plains, mid and peripheral portions of alluvial fans, marine plain and shallow buried ancient river channels, comprise the above-described sedimentary structure, and a strong earthquake gives a forceful shock to those geomorphic types, water and sand may easily erupt from underground to surface. Therefore, in seismological research, the geomorphologists should accurately demarcate the above-mentioned geomorphic types, whereas the engineers should pay particular attention to shock-proof measures on such geomorphic types.

9717
CSO: 4009

AUTHOR: JIANG Hongdi [5592 3163 4574]

ORG: Institute of Radiation Medicine

TITLE: "Unfolding Whole Energy Range Neutron Spectrum from Activation Data by Nonlinear Programming Method"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 241-248

TEXT OF ENGLISH ABSTRACT: This paper introduces a new method in which nonlinear programming is applied to determine the whole energy range neutron spectrum from the activation data. According to the different measuring conditions, a set of appropriate analytical expressions containing some undetermined parameters is selected or developed to describe the neutron spectrum to be measured. Then, an objective function is defined on the basis of the physical requirements of the measurement of the spectrum and minimized by means of nonlinear programming to obtain the optimum solution that satisfies the given reaction rates. Thus, a stable, convergent and continuous panoramic energy spectrum can be obtained while the appearances of spectrum oscillation and negative valued fluxes are completely avoided.

As an example, detailed results of the spectrum measured in channel No 1 of the Qinghua reactor are given. The incident neutrons are filtered by natural boron

[Continuation of JILIANG XUEBAO Vol 1 No 4, Oct 80 pp 241-248]

and lead, and the materials of the foils used are Mg, Al, S, Ni, In, Na, Mn, Co, Cu and Au.

AUTHOR: None

ORG: Research Group for JLG Laser Interferometer

TITLE: "JLG Laser Interferometer for the Automatic Measurement of Highly Accurate Gauge Blocks"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 249-257

TEXT OF ENGLISH ABSTRACT: The JLG laser interferometer is a new device for automatically measuring the highly accurate gauge blocks. Some advanced techniques are adopted in the interferometer, such as stabilized laser, electronic digital display, white-light interference fringes for automatically locating the surfaces of gauge blocks with a hollow corner cube prism and automatic control, etc. The limiting error of measured results for the instrument is

$$\Delta_{lim} = \pm (0.03 + 0.2L)\mu m$$

where L is the length of the measured gauge block in meters.

AUTHOR: LIU Yunzhu [0491 0336 5053]
MA Runshan [7456 3387 1472]
GUO Zhengqiang [6753 2973 1730]

ORG: None

TITLE: "The Exposure Standard"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 258-265

TEXT OF ENGLISH ABSTRACT: An exposure standard apparatus developed in NIM is presented. The exposure range of the apparatus is from 0.001 to 10 lux · second, the uncertainty of the exposure not exceeding ± 0.01 logarithmic unit. It basically satisfies the requirements of sensitometry and can be used to calibrate different types of sensitometers.

AUTHOR: None

ORG: Research Group for Photometric Primary Standard, NIM

TITLE: "The National Photometric Primary Standard of China"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 266-274

TEXT OF ENGLISH ABSTRACT: This paper gives a summary of the equipment and experimental results of the photometric primary standard of China. A method has been found for reducing the luminance fluctuation of the freezing platinum blackbody. The fluctuation may be reduced to within ± 0.3 percent from one freezing to another one. The luminance of the blackbody at the platinum freezing point agrees with that at the melting point within 0.2 percent. Our experience with platinum ingot No 2 showed that it was not contaminated after being used over 300 times. The total uncertainty of the photometric primary standard is ± 0.33 percent.

AUTHOR: CHEN Hongpan [7115 1347 4323]
CHEN Shouren [7115 1343 0088]
CHU Zaixiang [5969 6528 4382]

ORG: All of Harbin Industrial University

TITLE: "The Evaluation of the Emissivity and Temperature of Cavities at the Gold Freezing Point"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 275-286

TEXT OF ENGLISH ABSTRACT: According to the IPTS (68), Planck's formula is used to define the temperature above the freezing point of gold (1064.43°C). At present, the instrument adopted by most countries to realize the scale is the photoelectric pyrometer which is used directly for observing the spectral radiance of the bottom of a graphite cavity enclosed by pure gold. Because the depth-radius ratio of the cavity is large and the cavity wall is very thin, the error caused by the deviation from 1 of the apparent emissivity of the bottom and the temperature difference between the internal and external walls is negligible. However, in practice, when the stable thermal equilibrium is established at the gold freezing point, there is always a constant thermal flux radiating outward through the cavity opening which causes the inner wall temperature to always be lower than the gold freezing point.

In the present investigation, the integral equation for the temperature

[Continuation of JILIANG XUEBAO Vol 1 No 4, Oct 70 pp 275-286]

distribution inside the cavity and the relation between the emissivity and local temperature have been derived according to the basic ideas of Geist. These equations have been solved using a computer for some cylindrical cavities and the results are given in this paper.

AUTHOR: ZHANG Baoyu [1728 2450 0810]

ORG: None

TITLE: "The Relations Between the Magnetic Fields of the Helix Current and the Current Sheet"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 287-295

TEXT OF ENGLISH ABSTRACT: By analyzing and comparing the magnetic field distributions for both the helix current model and the current model, it has been proved that the average of the field for the helix current over the polar angle is exactly equal to the field for the corresponding current sheet, no matter what the size of the pitch will be. As a matter of fact, the field for the helix current is equivalent to the superposition of the field for the current sheet and a small sinusoidal quantity, which can be neglected when the pitch is small enough. Furthermore, the integral average of the field for the helix current over the spherical sample placed at the center of the solenoid is equal to the center field. These results have practical importance for further development of the determination of the gyromagnetic ratio of protons in the weak field.

AUTHOR: ZHANG Zhonghua [1728 6945 5478]

ORG: None

TITLE: "A Matrix Perturbation Method for Calculation of Errors in Precision Electromagnetic Measuring Circuits"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 296-298

TEXT OF ENGLISH ABSTRACT: A matrix perturbation method for the calculation of errors in precision electromagnetic measuring circuits caused by small variations of circuit parameters is described in this paper. The formulae for the calculation are very simple and can be used for finding errors of any order. The convergence conditions for the perturbation procedure are also given and discussed.

AUTHOR: FENG Xinshan [7458 2450 0810]
WU Youzhang [0702 1635 3864]

ORG: None

TITLE: "A Broadband Coaxial Low Power Standard"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 299-302

TEXT OF ENGLISH ABSTRACT: The broadband coaxial calorimeter described in this paper is developed as the national coaxial low power standard. The calorimeter is of the twin-load type, one load being the calorimetric body while the other provides a reference of temperature. RF power is measured by comparing with standard DC power. It operates in the frequency range of 1 to 8.2 GHz, and the total uncertainty is ± (0.17~0.26) percent.

The coaxial power meter is calibrated by means of the power equation concept. The calibration system is a three arm generalized reflectometer, and the total calibrated uncertainty is better than ± 0.27 percent.

AUTHOR: ZHANG Jucai [4545 0658 2088]

ORG: None

TITLE: "Some Experiments on the IEC-318 Recommendation for an Artificial Ear"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 303-306

TEXT OF ENGLISH ABSTRACT: Starting from a review of the IEC-318 recommendation for the artificial ear, analytical experiments were made for seven parameters of the analogical network with parameters varying one by one. Experimental curves and discussions are given.

AUTHOR: CHEN Shihua [7115 0013 5478]

ORG: None

TITLE: "A Fast Logarithmic Charge Amplifier for Liquid Scintillation Counting Device"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 307-315

TEXT OF ENGLISH ABSTRACT: This paper describes a fast logarithmic charge amplifier. Using this amplifier in a liquid scintillation counting device, absolute measurements of the activity of some radionuclides have been realized. The problem of closed-loop stability of logarithmic converters employing a bipolar transistor as logarithmic feedback element is discussed. A method for measuring the dynamic range of the fast logarithmic charge amplifier is described. Finally, the results of absolute measurement of the activity of several radioactive solutions by this device are given.

AUTHOR: ZHANG Lisheng [1728 0500 3932]

ORG: None

TITLE: "Technical Requirements for VCXO Used in the Cesium Atomic Clock"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese Vol 1 No 4, Oct 80 pp 316-320

TEXT OF ENGLISH ABSTRACT: Voltage controlled crystal oscillator (VCXO) plays an important role in the atomic frequency standard. The performance of VCXO must be excellent so as to maintain the inherent frequency accuracy and stability of the atomic standard. Through analysis, technical requirements for VCXO used in the cesium atomic clock are put forward in this paper.

9717
CSO: 4009

AUTHOR: HOU Guoben [0186 0948 2609]
LU Lisheng [4151 7787 3932]

ORG: HOU of Shandong College of Oceanology; LU of the Ministry of Transport

TITLE: "The Hydraulic Model Study of Vertical Shaft Axial Flow Pumps Used for Installation in Docks"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 1-12

TEXT OF ENGLISH ABSTRACT: Critical values of energy loss parameters are established as a basis for the proportioning approach to channel passages in hydraulic models on pump intakes. Models that satisfy the critical limits when adjusted experimentally to yield zero swirl of the suction pipe inlet have been found to give reliable indications of full scale behavior, both in regard to swirl correction and freedom from air entrainment.

This report suggests general results for use by design engineers engaged in power stations, pumping stations or dock design, and illustrates them by several examples of successful designs.

AUTHOR: XI Pan'gen [1153 4149 2704]
ZHANG Shuzhen [1728 3219 3791]
FENG Shizuo [7458 1102 460A]

ORG: All of the Department of Physical Oceanology

TITLE: "Mathematical Modeling of Circulation in the East China Sea"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 13-25

TEXT OF ENGLISH ABSTRACT: Based on the "wind curl-thermohaline gradient equation" proposed by Feng, one of the authors of this paper, and taking actual bottom fluctuation into account, a two-dimensional numerical model of steady-state circulation driven by a nonuniform surface wind and the thermohaline effect is presented. The model is applied to the East China Sea. The computations of winter circulation exhibit considerable agreement with the observed current field. The trend of circulation is almost parallel to isobaths. The Kuroshio exerts great influence on the southeast part of the area in question where the swift current flows nearly along the isobath for 200 meters, its main part outflowing from the east boundary of the region, while the other, the smaller one, flows and branches into the Tsushima Current and the Yellow Sea Warm Current. In the northern part of the waters there exists a counterclockwise "Yellow Sea Gyre System" consisting of the northward Yellow Sea Warm Current and the southward China Coastal Current. At the

southwest end of the area, the Min-Zhe Branch of the Kuroshio together with the Taiwan Strait Counter Current flows south in a semi-arc pattern along the north coast of Taiwan Island.

The influence of boundary forces, the thermohaline effect, wind stress vorticity and water depth on the circulation are estimated respectively. The computations show that the circulation pattern of the East China Sea, under the action of boundary forces (especially the Kuroshio System), depends basically on the bottom topography, with the thermohaline effect playing a determinant role in generation of the counterclockwise "Yellow Sea Gyre System." The wind stress, however, only acts as an adjustment factor and is of less importance.

AUTHOR: SHEN Yujiang [3088 5148 3984]

ORG: Department of Physical Oceanology

TITLE: "Numerical Computation of Tides in the East China Sea"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 26-35

TEXT OF ENGLISH ABSTRACT: For the East China Sea the hydrodynamical equation system of the co-oscillating tides is numerically solved by giving the values of tidal harmonic constants at the boundaries. Based on the computed results the co-tidal charts of four main constituents are drawn. With the help of the charts the propagation behaviors of tidal waves in the region are analyzed, and the formation of amphidromic systems and the distribution of tidal characteristic quantities are described. The author is of the opinion that there exists a semidiurnal degenerate amphidromic system near Jilong, Taiwan.

The comparison between the computations and observations exhibits excellent agreement, thus suggesting that our results can serve general purposes.

AUTHOR: LIU Liansheng [0491 5571 3932]
ZHANG Zhengbin [1728 2973 2430]

ORG: Both of the Department of Marine Chemistry

TITLE: "A Study of the Mutual Non-Interference Effect of Inorganic Ion Exchange in Seawater. II. Theoretical Explanation and New Experimental Verification of the Mutual Non-Interference Effect of Inorganic Ion Exchange in Seawater"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 36-52

EXCERPT FROM ENGLISH ABSTRACT: This article attempts to give a theoretical explanation of the mutual non-interference effect of inorganic ion exchange in seawater. Some new experimental results are presented for confirming the mutual non-interference effect of inorganic ion exchange in seawater.

AUTHOR: SHI Zhili [0670 5268 7787]
DAI Guosheng [2071 0948 7105]
WANG Hong [3769 4767]
et al.

ORG: All of the Department of Marine Chemistry

TITLE: "Determination of Nitrate in Seawater by Cadmium-Copper Reduction Method"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 53-63

TEXT OF ENGLISH ABSTRACT: The method based on that described by Crasshoff has been tested and the conditions of the method have been modified. The results show that temperature and salinity do not influence the determination of nitrate. The diameter of the cadmium grain was selected. If a suitable flowing rate, reductive column length and cadmium grain diameter from 7 to 60 mesh are controllable, an excellent recovery of more than 95 percent and high precision and sensitivity can be obtained. This method would be suitable for on-board routine analysis of nitrate content in seawater.

AUTHOR: WANG Qingzhang [3769 1987 3864]
TAN Yuehua [6151 1471 5478]

ORG: Both of the Department of Marine Chemistry

TITLE: "Determination of Sulfide in Seawater by Electrochemical Membran Sulfide Electrode"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 64-74

TEXT OF ENGLISH ABSTRACT: A method is described for the determination of sulfide in seawater by an ion selective electrode in which the electroactive membrane is made out of Ag_2S formed by an electrochemical technique. The background electrolyte solution is 1 M NaOH containing 5 mg/ml ascorbic acid as the antioxidant reagent. A linear Nernst response with the slope of 29.8 ± 0.2 mv/log C_{ST} is obtained over the total sulfide concentration range from 10^{-3} M to 10^{-7} M for seawater having different salinities ($5 \sim 35$ percent). The average standard deviation of the observed potentials is 0.6 mv, and the relative standard deviation of the sulfide concentration is 5 percent. The experimental recovery of sulfide is 101 ± 5 percent. The detection limit of sulfide is about 6×10^{-8} M. The interference of some heavy metals on the electrode response was tested, and the obvious interference of Cd, Pb and Cu can be eliminated by the addition of Na_2H_2EDTA and NaDDTC respectively. Data obtained for the seawater samples by the calibration curve, standard addition and graphical method are in good agreement.

AUTHOR: HUANG Weiwen [7806 5633 2429]
HE Chongli [6378 1504 0448]
ZHONG Xiayun [6945 7209 0061]

ORG: All of the Department of Marine Chemistry

TITLE: "Determination of Lead and Cadmium in Aqueous Environments by Anodic Stripping Voltammetry"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 75-79

TEXT OF ENGLISH ABSTRACT: A method for the determination of lead and cadmium by anodic stripping voltammetry with a general oscillographic polarograph fitted with a glassy graphite electrode has been investigated. The range of determination is 10^{-8} - 10^{-10} M. The method is simple and rapid and has been successfully applied to freshwater, seawater and polluted water samples.

AUTHOR: HU Zengmiao [5170 1073 8693]

ORG: Department of Marine Biology

TITLE: "The Determination of ^{40}K Contents of Some Marine Organisms of the Yellow Sea and the Bohai Sea"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 80-85

EXCERPT FROM ENGLISH ABSTRACT: The contents of ^{40}K for some marine organisms collected from the Yellow Sea and the Bohai Sea were determined. The results of the determination are summarized.

AUTHOR: CHEN Weisheng [7115 4850 0524]
FANG Zongxi [2455 1350 3356]

ORG: Both of the Department of Marine Biology

TITLE: "Some Effects of Indole-3-Acetic Acid (IAA) on Female Gametophytes of Laminaria japonica"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 86-90

TEXT OF ENGLISH ABSTRACT: In the present experiments three different sources of the female gametophytes of Laminaria japonica were used to study the biological effects of IAA. It was observed that higher concentrations (more than 10 ppm) of this chemical had evident lethal effects, and lower concentrations (such as 0.01 ppm, 0.1 ppm and 1 ppm) showed some effects of stimulation, that is, promoting vegetative growth of the female gametophytes. In mixed populations of female and male gametophytes the IAA effect was seen to be less obvious.

It is interesting to note that female gametophytes from different sources responded differently. It is believed that this difference might be due to different genotypes of the gametophytes. Another point worth mentioning is that IAA showed an inhibiting effect on the maturation of the gametophytes. As a result, the development of sporophytes was somewhat delayed when treated with IAA.

AUTHOR: CHEN Kuanzhi [7115 1401 2535]

ORG: Department of Marine Biology

TITLE: "The Anatomy of the Central Nervous System of *Penaeus orientalis* and *Portunus trituberculatus*, and Comparative Morphology of the Nervous Chain of Decapoda"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 91-99

TEXT OF ENGLISH ABSTRACT: The central nervous system of *Penaeus orientalis* consists of the following: Two pairs of ganglia, which belong to the anterior part of the head, form the brain of the animal. Four pairs of nerves arise from the brain, the first pair leading to the antennules, the second to the compound eyes, the third to the antennae and the fourth to the tegument of the head. From the back of the brain there emerges a pair of circum oesophageal connectives, which from either side of the oesophagus pass posteriorly to connect with the sub-oesophageal ganglion. The sub-oesophageal ganglion are made up of five pairs of ganglia. From the sub-oesophageal ganglion radiate five pairs of nerves on either side, these nerves supplying the mandibula, the maxillula, the maxilla, and the first and second maxillipeds respectively. The thoracic nerve chain possesses five pairs of ganglia, from the anterior four of which arise nerves that supply the third maxillipeds, and first, second and third pereiopods respectively. The fifth pair of ganglion consists of two pairs of ganglia, from which arise two pairs of appendage nerves,

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 3, 15 Sep 80 pp 91-99]

one pair to the fourth pereiopods and the other to the fifth pereiopods. Between the fourth and fifth thoracic ganglion there is an aperture which allows the passage of the sternal artery. The abdominal nerve chain possesses six pairs of ganglia, from which arise nerves that supply the five pairs of pleopods and one pair of uropods respectively.

The central nervous system of *Portunus trituberculatus* consists of the following: The brain of the animal appears to be similar to that of *P. orientalis*. However, in *Portunus* all of the ganglia of the ventral nerve chain are fused with the sub-oesophageal ganglion to form a large single mass from which arise all the nerves of the appendages in the mouth part, thorax and abdomen.

This paper gives a description and illustration of the comparative morphology of the nerve chains of every group of Decapoda so as to show the usual tendency toward concentration and fusion of the ganglion.

AUTHOR: SUN Ruiping [1327 3843 1627]
WU Baoling [0702 1405 6845]
YANG Dejian [2799 1795 3362]

ORG: SUN and WU both of the Institute of Oceanology, Chinese Academy of Sciences; YANG of Shandong College of Oceanology

TITLE: "A Study of the Morphology and Larval Development of the Neanthes japonica (Izuka) from the China Sea"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 100-110

EXCERPT FROM ENGLISH ABSTRACT: This report is part of the study on the morphology and larval development of species of the family Nereidae found in the China Sea.

Neanthes japonica (Izuka) is a specific species in China and Japan. It is usually most abundant in sandy-mud sediments and estuaries of the Bohai (Dalian, Beidaihe, tianjin, Yantai), the Yellow Sea (Qingdao, Weihai) and the Changjiang River (Shanghai).

Neanthes japonica and N. diversicolor are very similar in morphology, but they are different in reproduction. During the spawning season, N. japonica was found in the marine regiments. They were collected on 15 March 1963, at temperatures of

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 3, 15 Sep 80 pp 100-110]

8-10°C in the seawater of Qingdao. The larvae developed slowly and settled on the 21st day with seven-setiger nectochaete. Settlement and metamorphosis occurred in a relatively short period of time because in only three days it metamorphosed from seven-setiger nectochaete to ten-setiger juvenile.

The sequence of the early embryology and larval development is summarized.

AUTHOR: WANG Weixin [3769 4850 2450]
WANG Qingzhang [3769 1987 3864]

ORG: WANG Weixin of the Department of Marine Physics; WANG Qingzhang of the Department of Marine Chemistry

TITLE: "A Useful Potentiostat in Voltammetry"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 111-116

TEXT OF ENGLISH ABSTRACT: A potentiostat for compensating potential drop as iR and electrode polarization in voltammetry has been constructed from an operational amplifier. It is conveniently used for three-electrode voltammetry when measurements have to proceed in very dilute solutions, organic mediums or have to operate with micro-electrodes. The operational amplifier circuit of the potentiostat and experimental results of the three-electrode system compared with a two-electrode system were detailed.

AUTHOR: LIU Lianji [0491 6647 0679]
WANG Fengcong [3769 7364 5115]
PAN Ruoyan [3140 5387 8827]
XU Liezhong [1776 3525 1813]
WANG Weixin [3769 4850 2450]
ZHAO Yuzhi [6392 3768 5347]

ORG: All of the Department of Physical Oceanology

TITLE: "An Instrument Measuring Gradients of Temperature, Humidity and Wind Speed Above Sea Surface"

SOURCE: Qingdao SHANDONG HAIYANG XUEYUAN XUEBAO [JOURNAL OF SHANDONG COLLEGE OF OCEANOLOGY] in Chinese Vol 10 No 3, 15 Sep 80 pp 117-125

TEXT OF ENGLISH ABSTRACT: The principle, method, application and accuracy of an instrument which measures gradients of temperature, humidity and wind speed above the sea's surface are described.

This instrument can be used to measure gradients of the above-mentioned quantities within 5 meters above the sea's surface at four different heights. The sensor detecting temperature and humidity is a pt resistor ($R_0 = 500$), and the sensor detecting wind speed is a cup anemometer. The signals of temperature, humidity and wind speed are converted by an A-D circuit and digitally displayed. These

[Continuation of SHANDONG HAIYANG XUEYUAN XUEBAO Vol 10 No 3, 15 Sep 80 pp 117-125]

sensors are set on a buoy, the yan of which will be less than 5° under Beaufor wind scale 5. The signals are transmitted by a calle of 20 cores to a digital display system on board. The accuracies of measurement are:

± 0.05°C (for temperature),
± 3% (for humidity) and
± 0.2 m/sec (for wind speed).

9717
CSO: 4009

AUTHOR: WANG Jiangang [3769 0256 0474]

ORG: None

TITLE: "Lofty Ships Watch the Skies: Missile Range Instrument Ships in Space Technology"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 7, 20 Oct 80 pp 2-3

ABSTRACT: When China conducted an intercontinental ballistic missile test on 18 May 1980, a number of ships were waiting for the splashdown at latitude 7° S, longitude 171° 33' E. They included instrument ships, recovery ships and others. Before the missile splashed down, the instrument package was ejected, and was recovered from the ocean by a diver descending from a helicopter. The role of instrument ships in space technology is described on the basis of the ships used in the United States Apollo program. These ships, with displacements ranging from 12,000 to 21,600 tons, were equipped with S band and C band radars for tracking purposes. Diagrams are used to describe the procedures in the launch stage, orbit stage, reentry stage and landing stage.

AUTHOR: ZHANG Shipei [1728 0013 3099]

ORG: None

TITLE: "Favorites in the Energy Crisis: Energy-Saving Ships"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 7, 20 Oct 80 pp 12-13

ABSTRACT: The 65,000 ton Japanese ship Aramo has attracted great attention because of its energy-saving design, which cuts fuel consumption by a quarter. The two main ways of saving on fuel, which may be consumed at the rate of 65 tons or more a day, are to lower the most efficient screw rotation speed and to use waste heat recovery measures. Changes in propeller rotating speed require larger propeller blades, which encounters the limiting factor of available space. Waste heat recovery is aimed at recovering some of the 60 percent of the total energy produced in combustion which is lost. Waste gases at up to 400° C are used to make steam in a waste heat boiler; the steam can be used to drive a steam turbine as an auxiliary propulsion source or an electric power generation unit, or for ship functions. The Aramo used the Kawasaki KSE system, with energy savings of 21-28 percent. The new Mitsubishi D/MAP system is more flexible than the KSE system since it has a clutch system which makes it possible to use steam power for either propulsion or power generation.

AUTHOR: YAO Jiajin [1202 1367 3866]

ORG: None

TITLE: "The Tomahawk Ship-Launched Cruise Missile"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 7, 20 Oct 80 pp 16, 15

ABSTRACT: The NATO response to deployment of the Soviet SS-20 is deployment of the US SSBS-2 and cruise missiles. The Tomahawk cruise missile can carry a conventional or 200-megaton nuclear warhead. It has a range of 1,700 miles and high accuracy. It can be launched from a submarine, from the Nimitz carrier or from Spruance class destroyers. Its primary guidance system is Terrain Contour Matching (TERCOM), in which radar altimeter measurements are compared with a stored digital map. Near the target, where this system renders the missile more easily detectible, an image matching system is used, tripling the accuracy. To defend against this, the Soviets will have to build many dummy installations, but the cruise missile is cheap, so many can be launched at targets. In the event of a major European war, Soviet Backfire bombers will launch AS-6 antiship missiles at NATO ships bringing troops and materiel to Europe. The cruise missile is the most effective means of destroying the Backfire bases. In addition, because US carriers are too few to cover all areas in which the US desires to exert influence, the use of cruise missiles aboard destroyers and cruisers in the Indian Ocean will be beneficial.

AUTHOR: LIN Hua [2651 5478]

ORG: None

TITLE: "The Styx Missile"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 7, 20 Oct 80 pp 22-24

ABSTRACT: During the 1967 Mideast war, the Israeli destroyer Eilat was sunk by 4 Styx missiles at a distance of 15 miles from Port Said, proving the importance of this weapon. The Styx, or SS-N-2, is an aerodynamic missile powered by a solid-fuel auxiliary motor and a liquid-fuel main rocket motor with a range of 35-40 km, which has been supplied by the Soviet Union to many countries. India used it to sink a Pakistani destroyer in the Indo-Pakistan war. It can be mounted on small, fast boats such as the Soviet Komar and Osa class. It flies low (100-300 meters, or as low as 10 meters) and is not maneuverable. By the 1973 war, Israel had developed the Gabriel antiship missile, which sank 9 Arab ships, while none of the small, fast Israeli missile boats was hit. Countermeasures were found to render the Styx guidance system ineffective.

END

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CHINA REPORT

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APPLIED SCIENCES

VISIT TO ATOMIC ENERGY INSTITUTE DESCRIBED

Beijing BEIJING WANBAO in Chinese 10 Aug 80 p 2

[Article by Guo Jian [6753 0265] and Shuang Yin [7175 0603]: "A Visit to the Institute of Atomic Energy"]

[Text] When the news came that we were going to visit the Institute of Atomic Energy, everyone was very excited because atomic energy is so unfamiliar and mysterious to us. As soon as our car left the city of Beijing, it dashed toward the southwest. After we passed Liangxiang town in Fangshan County, from time to time we could see quite a far distance away a group of red buildings behind a forest of green trees. There it was, the Atomic City, a place we were so anxious to see.

The institute is about 50 kilometers from Beijing. It is situated in front of Yan Shan and is a neighbor of the Petroleum City--Yanshan Petrochemical Company. Since the ground-breaking in 1956, it has developed into a small town of 13,000 persons and has since been named Xin Zhen [New Town] of Fangshan County. We were, therefore, not exaggerating when we referred to it as the Atomic City.

Our car passed through the residential area and, following the directing arrow signs, turned into the plaza of the institute. The first to welcome us was the big, tall reactor cooling tower, majestically and solemnly telling us that "Now you are in Atomic City!"

Receiving a group of laymen like us, the hosts were bound to spend more breath. After they conducted an educational initiation on atomic energy for us, the host said: "People are always afraid of radiation the moment they hear the mention of atomic energy. Actually, radiation is like a tiger--it may eat people when it is in the mountains but it is for us to watch when placed in the zoo." What an esoteric and penetrating analogy!

According to Wang Ganchang [3768 3227 2490], the 73-year-old director, the Institute of Atomic Energy is a multi-disciplinary research institute engaged in the basic and applied research of nuclear physics, radiation chemistry and atomic reactors. In addition, the institute also develops and produces radioactive and stable isotopes. The enthusiastic host first led us to see the reactor.

From the outside, the reactor building looks like an ordinary 4-story building. But when we got to the third floor and went through a big gate, a brightly-lit big hall appeared before our eyes. The atomic reactor, a cylindrical object more than 9 meters in height, stood at the center of the hall. On top of the scaffolding around the reactor, people were busy working. Overhead cranes were moving back and forth. Even on top of the reactor, there were a few people working. It turned out that the reactor crew was preparing the reactor for a physical start-up after they had completely overhauled the reactor active area according to the directives of "improve, make use of the potential and reform."

Reactor Chief Engineer Ma Fubang [7456 4395 6721] told us that the full name of the reactor was "Research Heavy-Water Reactor." It was introduced from Russia and its operation began on 27 September 1958. At that time, the pick-up mechanism of radioactive targets at the vertical port of the reactor was very crude—something like the tackle (Chinese windlass) used for farm wells in China—and the reactor must be shut down when targets were being placed or picked up. Hence, the reactor was able to irradiate only small quantities of experimental radioactive isotopes. Also, there were no experimental set-ups in the horizontal port channel. So the Chinese scientists decided to modify the reactor so that its utility can be extended. After repeated exploration, they devised an electric vacuum grab hook which can automatically change targets by using a cantilever overhead crane operated remotely without the need to shut down the reactor. Television monitoring was also used. These changes have greatly enhanced the usefulness of the reactor and the radioactive isotopes produced by the reactor have served provinces and municipalities all over China, except Taiwan and Tibet. Experimental facilities were also set up in the horizontal port channel for various types of research work. When the reactor was brought in, its rated power was 7,000 kilowatts and its reinforced power for short time duration was 10,000 kilowatts. After a series of improvement measures, the reactor operated at 10,000 kilowatts output for quite some time and thus made its contribution to the development of atomic energy in China.

Ever since the reactor started operation, it has had 20 years of safe running, thanks to the careful maintenance and the continuous improvements made by the workers. In 1978 the reactor reached its life limit. Inner shell active area container developed small leaks, the leak flow rate at the service pipe socket increased and other facilities also suffered damage to various degrees. On 8 November it finally stopped operation. Under such circumstances, what should we do? Should we just close the reactor permanently and "retire" it? Or, should we try to rebuild it somehow? Large-scale rebuilding projects of this kind are rare even in foreign countries because of the great difficulties involved and the risks one has to take. But the institute decisively chose to go ahead with the rebuilding.

The biggest technical hurdle in the rebuilding was the handling of the inner shell active area container which, after 20 years of use, has become a "strong radioactive source." People must stay far away from it to prevent radiation hazard. Any hoisting operation must be done through remote control and performed safely and cautiously since the results otherwise would be unthinkable. In Canada, the handling of this type of facility is done by transporting it to an unpopulated area on a trailer. The Chinese scientists and workers, however, chose to use a permanent on-the-spot storage method instead, that is, to bury the entire inner shell deep in the ground right beside the reactor. The entire operation was carried out by using long distance remote control and full use was made of the existing hoisting machinery and field facilities. Its procedures are more convenient to carry out, it had a better reliability and it cost less. With a closely coordinated effort of the technicians and workers, the hoisting and burial of the "strong radioactive source" succeeded in the first trial.

We were told, in front of the reactor control panel, by Chief Engineer Ma that the big reactor overhaul project ended on 27 June of this year and the reactor has now entered its physical start-up and its engineering start-up stages. Operation at large output power will follow and there will be a certain amount of increase in the rated power of the rebuilt reactor.

9698
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ASTRONAUT TRAINING ACTIVITIES ILLUSTRATED

Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 4, Apr 80 centerfold

[Article: "The March Towards Space"]

[Text] The photographs shown on these pages are selected scenes from an educational film entitled "Marching Towards Space," which is being produced by the Shanghai Scientific Educational Film Factory. These particular scenes illustrate the training activities of astronauts. Other parts of the film also illustrate other interesting facts about modern space technology such as carrier rockets, artificial satellites and space ships.

The contents of the pictures are as follows: 1) Astronaut trainee trying on a space suit, which is a special clothing designed to ensure the safety of astronauts in space. 2) Astronaut trainee getting ready to enter a centrifuge for g-load test. The centrifuge has a long steel arm with a seat attached to it; when the centrifuge begins to rotate at high speed, the astronaut will be subject to large centrifugal force equivalent to the g-load condition experienced during a rocket launch. 3) Astronaut trainee undergoing impact test. During the test, the astronaut lies in a foam-rubber chair which is dropped from a height of 20 meters of the impact tower. This is to simulate the possible impact condition during the landing of a space ship. 4) Astronaut trainees observing the stars in the universe from a simulated spaceship cabin. 5) Astronaut trainee in space suit being tested in the spaceship simulator. 6) Three astronaut trainees tasting the specially prepared "space food."

3012
CSO: 4008

GENERAL PURPOSE GASEOUS RUST INHIBITOR DEVELOPED

Beijing BEIJING RIBAO in Chinese 12 Aug 80 p 2

[Article by Zhang Jiwu [1728 4480 2976]: "Report on Gaseous Rust Inhibitor Developed by Special Steel Technician Zhang Jiwu [1728 0679 0710]"]

[Text] Beijing Special Steel Mill technician Zhang Jiwu [1728 0679 0710] has successfully developed a general purpose gaseous rust inhibitor after tackling the difficult technical problem of rust prevention on steel wire solders with great perseverance.

In the past, oil has generally been used as a rust inhibitor on steel wire solders manufactured by various plants in China. If the oil layer is put on too thin, the solder wires will rust very quickly. When the oil layer is too thick, then, it cannot be easily washed off before use and it causes adverse effects in the quality of the solder joint and in the working conditions. At the beginning of last year, technicians Zhang Jiwu, working in the Technical Division of the mill, and Jia Anqing [6328 1344 1987] of the Steel Wire Shop jointly investigated this difficult problem. They went to the libraries and bookstores to search for technical information and, after more than one year's hard work on dozens of different test agents and mixing ratios and hundreds of experiments, they finally succeeded in producing a general purpose gaseous rust inhibitor. Steel wire solders treated with their rust inhibitor do not rust in a humid environment for more than 1 year. Tests conducted by the users indicated that the new rust inhibitor has good electrical conduction properties, maintains stable arcs and produces relatively little spattering and fume. The working conditions are, therefore, improved. Furthermore, stretching, bending and impact tests performed on the soldered pieces have shown that steel wires soldered with the new gaseous rust inhibitor are far superior to those treated with oil. This new product has made its contributions to the rust prevention technology for metallurgical products in China.

9698
CSO: 4008

LIFE SCIENCES

SUCCESSFUL THERAPY IN COMPULSIVE NEUROSIS CASES REPORTED

Beijing ZHONGHUA SHENJING-JINGSHENKE ZAZHI [CHINESE JOURNAL OF NEUROLOGY AND PSYCHIATRY] in Chinese Vol 13, No 3, Sep 80 pp 161-165

[Article by Dong Jingwu [5516 4842 2976] and Li Xintian [2621 1800 3944], Institute of Psychology, Chinese Academy of Sciences; and Tian Zuen [3944 4371 1869] and Wen Chuanrun [3306 3123 3387], Beijing Anding Hospital: "Behavior Correction Therapy in Obsessive Compulsive Neurosis"]

[Text] I. General Exposition of Obsessive Neurosis and Correction Therapy

Obsessive compulsive neurosis is a separate neurotic ailment in the category of neuroses which is manifested by a slight degree of functional nervous obstruction. By obsession is meant a compulsive nature or a compulsive quality that frequently includes some involuntary, irrational, unrealistic, and unnecessary recurring notions, ideas, fears, or impulses. By compulsion is meant a manifestation in the daily life of the patient of irrational and unnecessarily duplicative action, or habitual speech or other complex forms of behavior. Some literature notes six symptoms for obsession and two symptoms for compulsion.[1] These are discussed individually below:

1. Obsessions include: (1) obsessive doubt, not believing that one has successfully completed a task or a job; (2) obsessive thinking, a superficially endless thought cycle, frequently centering on some future event; (3) obsessive impulse, a powerful desire to commit some pointless act or to carry out some socially destructive or offensive action; (4) obsessive fear, a fear of losing self-control and constant apprehension about making mistakes; (5) obsessive image, maintaining in the brain a picture of some recently seen thing or event; (6) any other phenomenon of an obsessive character in addition to the five given above.

2. Compulsions include: (1) yielding compulsion, meaning a type of compulsive action that expresses some hidden desire; (2) controlling compulsion, in which compulsive action transfers the hidden compulsive idea. In other words, it means a new compulsive activity produced in order to control an old compulsive idea.

Ordinarily we are not this detailed in our distinctions, instead laying stress on the three principal symptoms of compulsive ideas, compulsive feelings, and compulsive actions. In some patients it is compulsive ideas that are dominant; in others, it is actions. But when actual flareups occur, the three are frequently related, with the compulsive ideas and compulsive feelings happening first, followed by an outbreak of compulsive actions.

The obsessive compulsive patient is quite aware that his compulsive ideas, feelings, and actions are absurd and unnecessary, and he consciously attempts to control them, but frequently matters go contrary to his wishes, and the patient cannot help continuing to think, or continuing to be stimulated, or continuing to act. Unless he continues to think or act, he is not comfortable and becomes more frustrated. As the neurosis advances, the patient discovers an ever-increasing weakening of his will to control and his ability to regulate his own ideational activity or actions, and he then realizes that he is ill and voluntarily seeks treatment.

The incidence of occurrence of obsessive compulsive neurosis in the general population is about 0.05-1 percent, but among patients with neurotic disorder the incidence of obsessive neurosis is quite high, possibly 1 to 2 percent. It occurs with equal frequency in males and females. It usually occurs before the age of 20, and the oldest child or an only child is prone to it. People with higher cultural levels or intelligence who are inclined toward abstract thought are prone. Many people who have obsessive qualities or symptoms do not necessarily become obsessive compulsive neurotics, so the relationship between personality and abnormality is not definitive.

The pathenogenesis of obsessive neurosis is explained in various ways: (1) The Freudian psychoanalytical school believes that obsessive neurosis results from psychological conflicts of a special nature and psychological repression. Compulsive behavior is a reaction that comes about subsequently, in an effort to conceal the tendencies that were repressed in the child in its early years. Compulsive behavior is a means of disguising self-reproach which originates during childhood.[2] (2) Classical behaviorists or learning theoreticians believe that obsessive neurosis results from an abnormality in the stimulation of the nervous system and inhibition of the nerve centers, and that an irregularly stimulated nervous system leads to an abnormal nervous relationship, which produces a persistently stagnant and inert focus of excitation--i.e., an isolated bingdian [4016 7820]. Compulsive "thought rumination" is most likely to occur among psychasthenics in whom the second signal system is dominant over the first signal system. The repeated cycle of stimulus and response gradually becomes a fixed behavior form or a learned habit. (3) Still another explanation is that compulsiveness arises out of conflicts in motivation and the frustration of emotions, with the conflicts and emotional frustrations arousing a high degree of anxiety within the sufferer, causing dejection and agitation. In order to rid himself of this anxiety and agitation, the sufferer frequently manifests a series of involuntary and irrational absurd behavioral acts under the control of his subconscious. Such repeated impulsive behavior increases rather than decreases, with resultant loss of control. Not only does the original agitation remain unresolved, but new tensions, fears, suspicions, and such obsessive symptoms are created. Looked at in terms of physiological processes, the thalamus is the main seat of emotional regulation, and the interbrain is the information transmission station between the sensory organs and the cerebral cortex. When a person's emotions are given a shock, it is this transmission station that receives a powerful stimulation, causing the entire cerebral cortex to produce dramatic mental overactivity. The programming of nervous activity goes out of control, going into a state of stimulation that cannot be consciously controlled, or into a constantly tense emotional state. In 1936, W. B. Cannon was the one who earliest described this sort of emergency reaction, terming it "fight or flight," which is characterized by the increased formation of catecholic amine accompanied by a rise in blood pressure and more rapid heartbeat and breathing, as well as by a markedly increased flow of blood to the skeletal muscles. In tests conducted on the thalamus of animals, direct stimulation of the covering of the midbrain and the central gray matter was able to induce such emergency reactions.[3]

In summary, there are three principal explanations for the pathogenes of obsessive compulsive neurosis: (1) early repression; (2) learned bad habits; and (3) emotional frustration.

There is as yet no therapy abroad that is considered to be effective for obsessive compulsive neurosis. Traditional therapeutic methods include medicinal treatment, electric spasms, brain surgery, psychological therapy, and changed environment, none of which is very effective. Recent therapeutic measures have increased behavior-correction therapy. We know that obsessive compulsive neurosis is a psychogenic ailment requiring use of comprehensive treatment methods, of which psychological therapy is the major one, and the use of behavior-correction therapy to deal with compulsive notions to obtain fairly satisfactory results.

Clinical application of learned tenets of behavioral-correction therapy has developed rapidly during the past 20 years as a result of scientific behavioral experiments. In clinical treatment centering on abnormal behavior of patients, either in real-life situations or devised situations, abnormal behavior has been eradicated. Through specially designed programs, normal behavioral habits have gradually been established. In essence, through conscious external correction, a gradual effect on internal functioning of individual behavior can be observed. Inasmuch as the patients' compulsive symptoms had already become bad habits which appeared and reappeared and were extremely persistent, only through the study of theory and a series of behavioral experimental methods was it possible to provide the patients with effective study of experiences, study of environments, and study of techniques. Biological feedback, system desensitization, and suppression therapy have derived from behavioral experiments with animals, while relaxation reaction therapy has derived principally from the summarization of study and practical experiments with man himself. In therapeutic practice, we have used biological feedback primarily on the heart rate, system desensitization, and static state relaxation reaction and dynamic yishou [1942 1343] training. Relaxation of the skeletal muscles as a result of slowed heartrate is an objective indicator signifying a trend toward calmness in the emotional state. We used an electronic heartrate meter for direct display of the effects of training on the patient. In the process of heartrate feedback training, each time the heartrate reading declined 5 to 10 points (the equivalent of one-tenth the original heartrate), a "success" signal was fed back to the patient. Patients gradually learned through the guidance of definite experience procedures how to regulate the direction of their own efforts (level of relaxation) on the basis of signals for success or failure. Once the heartrate had gradually declined to a suitable level, it was maintained there for about 20 minutes or so.

Our use of system desensitization was for the purpose of getting rid of compulsive obsessive behavior caused by strong feelings of dread. On the basis of the conditioned reflex principles combined with relaxation techniques, the patient, when in a relaxed state, was repeatedly subjected to increasingly greater unpleasant stimulae until he no longer reacted to, was insensitive to, suppressed, or got rid of the feelings.

Static relaxation reactions were aroused principally through the regulation of breathing, relaxation of skeletal muscles, and yishou. Static relaxation reactions are characterized by decreased activity of the body's entire sympathetic nervous system, with marked improvement in anxiety states. This kind of relaxation reaction was induced by Hess through stimulation of an area in the hypothalamus of a cat.

The purpose of dynamic yishou training is to gradually enlarge the effects of training in the patient's daily dynamic environment, so that when he is removed from the instruments, the patient can make every effort to reduce the frequency of occurrence of his compulsive ideas and activities; this is extremely important in the prevention of recurrences. Detailed reports are available about the use abroad of heartrate feedback to treat anxiety and dread neurosis,[4] the use of relaxation reaction to treat anxiety neurosis,[3] and the use of system desensitization and ideational interruption therapy to treat compulsive neurosis.[5] All methods and principles are reported.[6]

In the course of the above-described corrective therapy, patients were led, through proper psychological therapy, to reveal early repressions and anxieties, and patients were helped to analyze the causes for their illness through an explanation of the principles underlying corrective therapy and through a formulation, in conjunction with the patient, of an agenda to set up new rules for living and to change old habits. Gradually, confidence in triumph over the ailment and determination were established. The goal of this series of psychological therapy is to increase the ability of the patient to understand and to establish in the patient a proper attitude about himself and about reality, so that he can overcome his own compulsive symptoms and take the initiative in carrying out all the measures involved in corrective therapy, with the patient himself playing the main role in the therapeutic process.

Effective methods and a proper attitude are the two keys.

Once therapy has been completed, regularly scheduled followup interviews should be maintained. These can fortify and increase the effectiveness of the therapy by supplying continued supportive guidance. They can also uncover new problems and summarize experiences.

II. Diagnosis and Treatment, and Their Results

Between mid-May and mid-September 1979, behavior-correction therapy experiments were conducted at Anding Hospital in Beijing.

Table 1. Course of Treatment and Specific Requirements

Method	Requirements		
	First Course of Treatment	Second Course of Treatment	Third Course of Treatment
Living highlights	Prescribed rest periods.	Gradually increased exercise topics.	Exercise methods become a habit.
Medication	Amount maintained.	Reduction in medication.	Halt to medication.
Psychological therapy	Analysis of pathogeny; correction of patient's understanding of himself, his ailment, and of reality. Encouragement to patient to rebuild confidence and to take the initiative. Point out patient's weaknesses and bad habits.	Analyze ailment for patient and give him an explanation of principles underlying behavior-correction therapy. Strengthen patient's motivation to prepare to change his habits and his personality. Permit patient to understand the meaning of training measures.	Revive or establish ideals and interests. Help resolve the practical difficulties in employment, love, marriage, and environment. Instruct in the meaning of measures to prevent recidivism.
Behavior training	Three times per week, abdominal breathing exercises, static relaxation exercises, heartrate feedback exercises, and dynamic yishou exercises.	Six to 12 times per week, hearing feedback exercises; conduct of systematic desensitization of fears and compuslive actions; building of conditioned reflexes when removed from instruments.	Without keeping track of time or the number of times, and without being on the instruments, learning to do exercises alone, to make self-evaluation, to practice self-control, and to carry out dynamic yishou exercises to prevent recurrence.

Instrumentation. (1) Electronic pulse meter, Type DM-1 (produced by the Shanghai Hunan Electric Instrument Plant); (2) Heartrate reduction signal feedback box (self-made); (3) Breathing-cycle adjustment box (self-made).

Ambient conditions: Silence required in therapy room; light can be regulated with black curtains.

Patient selection: Patients who have been definitely diagnosed as having obsessive compulsive neurosis, and who had undergone the first course of treatment without a hitch.

Course of treatment and methods: For specifics, please see Table 1.

Objective indicators. When using heartrate feedback, numerical value for each reduction in heartrate (please see Table 2).

Table 2. Record of Decline in Heartrate During Heartrate Feedback Exercises

		Succession															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Heartrate, Times per Minute	Before exercise	65	85	80	75	85	80	72	75	70	70	70	75	85	80	75	75
	After exercise	48	72	72	65	75	67	55	62	60	60	60	65	70	65	65	65
	Numerical value for reduction	17	13	8	10	10	13	17	13	10	10	10	10	15	15	10	10

Conclusions: After three patients had undergone three courses of treatment in behavioral correction as outpatients, one was virtually completely cured, and the other two showed marked improvement (because of instrument outages, these two had few exercises).

III. Excerpts from the Medical Record

Case 1. Male, 29 years old. Junior middle school graduate. Single. After having obsessive fears for 14 years, patient came to hospital for diagnosis in March 1978. While walking along the street one day in 1965, a feeling of misery that was difficult to describe suddenly afflicted the patient, and from then on, whenever he went outdoors, his whole body felt tense; he feared meeting people; feared that others would see him, and whenever anyone did see him, his face became red. Consequently, he did not dare go to public places, and he did not dare go to stores to buy things. If he forced himself to go out on the street, his body would feel extreme discomfort, and he would feel very said and would be in a tense state all day long. One year later, his symptoms intensified. He would be at a loss to know what to do about events that had happened; he felt he could not analyze problems; he became fond of working on inconsequential matters, and he felt that his brain was different from that of others. Later on, this feeling of "unnaturalness" became increasingly severe and became a preoccupation. He felt that his own clothes would change color and that the skin on his hands would change color. After March 1968, he began to have insomnia, and as soon as any notion entered his mind, he would feel extreme discomfort and would have a pain in his heart. Upon meeting anyone or upon meeting his colleagues, he would become furious, and vent his anger to the point where he was not even able to eat with anybody. After 1969, he began becoming suspicious and anxious. He suspected someone was watching him and talking about him, as though people's every movement was directed against him. He worried about things in the past, and upon awakening from an afternoon nap, he would feel all of his pockets, fearful that something had been lost or was stolen. He himself realized that this was unnecessary, but he was unable to stop doing it. In 1973 he made friends with a woman, but gradually he lost interest in females and showed repression of feelings, but he also feared not being able to find a mate. He was often filled with anxiety, feeling that he had lost his hair and that others were luckier than he. Subsequently, he gradually realized that his symptoms were becoming more and more uncontrollable and that his illness was worsening. He wrote numerous letters to hospitals in Beijing, and he also read some medical books.

The patient had gone full term in gestation and had been born without complications. He was a middle-school graduate. In primary school, the patient had had scarlet fever. Neither his father, mother, nor brothers have had a similar history of illness. The patient had been timid and shy from an early age, and upon entering primary school he had a stuttering impediment, a lack of confidence, no definite ideas of his own, was indecisive, and lacked deep convictions in handling matters.

The patient's growth was good and he had no physical abnormalities. The patient had a lucid mental alertness, answered questions fluently, had self-knowledge, and normal sense of direction. He sought treatment urgently. On the basis of the patient's major symptoms, he had obsessive fear reactions, obsessive suspicion symptoms, and obsessive actions. The patient felt pained by many of his symptoms, but he was unable to get rid of them. The patient was able to criticize his obsessive symptoms. The obsessive symptoms appeared repeatedly and continued to exist. There was a definite scope to their main theme, and they had come to be the major ingredient in the patient's thinking, affecting both his work and his life. Before the patient had become ill, his temperament had manifested psychasthenia, for which reason he was diagnosed as being an obsessively fearful compulsive neurotic.

At the end of May 1979, the patient underwent behavior correction therapy. The patient said that for more than a year he had been taking xiaojianding [4285 1015 1344 1353], Duoluping [1122 1982 1627], Jiannao [0256 5207] No 1, and tranquilizers, but none of these medicines had proven effective, so as soon as therapy began, he ceased taking all medicine. Between June and the middle of September, three courses of therapy had been completed. Each week, at least three outpatient psychological treatments and behavior exercises were taken. For a record of heartrate feedback numerical values in the course of the therapy, please see Table 2. On average, each exercise reduced the heartrate by more than

10 beats per minute. System desensitization of the patient consisted of three items: "unnatural feelings," "face-reddening fears," and "agoraphobia." Methods used followed conventional desensitizing procedures.[6] The patient basically learned the static relaxation exercises and the static yishou exercise and was able to do the exercises by himself, away from the instruments.

Results of therapy and followup interviews. The patient is presently able to control harmful fear reactions; divest himself of feelings of pain, and get rid of "guilt" anxieties. He has no sense that his clothing or the color of the skin on his hands are changing color, and he is interested once again in having female friends. Now he can go openly to places where there are a lot of people and run or exercise in the street. The patient feels a lightheartedness such as he has not experienced in more than 10 years. All serious symptoms have been substantially overcome; he has been evaluated as being virtually entirely cured; and he has formally gone to work.

Case 2. Male, 28 years old. University graduate. Married. Because of obsessive notions and checking and rechecking behavior for a period of 12 years, he came to the hospital for diagnosis in November 1978. At the time of the Great Cultural Revolution, the patient had carelessly written a political slogan on a blackboard that caused others to misunderstand, and which was regarded by his classmates at the time as being a reactionary slogan, for which he was subjected to criticism and termed a reactionary student. Because of excessive mental tension and anxiety, he began to have headaches, his memory deteriorated; he had difficulty understanding what he read; he had many dreams, and he slept poorly. He dropped out of school for more than 3 months, did not get prompt therapy, but before his illness was completely ameliorated, he returned to school. Subsequently, he was assigned to live and work in a rural production team. During his 6 years in a rural village, he was a barefoot doctor. In 1973, he was selected to attend university, where he gradually discovered that each time he had a headache, it was always related to the appearance nearby of some picture. Whenever he was working, thinking, or talking to someone, if anything with a picture came into his line of sight, he would have a headache or his headache would get worse. As a result, he frequently worried about the reason for this phenomenon, and tried to get rid of this pain. In 1975, his headaches worsened, and he began to take tranquilizers. In 1977, following graduation, he was assigned to work as a Chinese herbal doctor and to perform acupuncture and moxibustion work. The patient was thoroughly unhappy with this specialized employment, feeling that it had no future and that people would look down on him. His mental pressures increased daily, and he became pessimistic, dejected, and greatly upset. Subsequently, he was diagnosed at the Beijing No 3 Hospital as an obsessive compulsive neurotic. He once tried unsuccessfully to be transferred to other work. His condition grew worse. In addition to headaches and insomnia, a series of fantasies repeatedly occurred in his brain, which he was unable to get rid of. His memory became worse for a long period of time; he had palpitations; his hands and feet perspired, and he vomited from nausea. He took tranquilizers in ever larger doses, going from 7.5 mg per day at first to 45 mg, but still without being able to control the symptoms. For a year he had been taking xiaoji'anding [4285 1015 1344 1353], to which he had become addicted. If he failed to take it for a day, withdrawal reactions resulted, and if he stopped taking it for 3 days, he became dizzy and walked with a stagger. Each time he entered a room to study, he exhibited obsessive checking behavior. He first had to examine items in his surroundings before he could be at ease. This checking behavior made it difficult for him to concentrate his energies on studying. He had been previously diagnosed by the psychiatric departments of other hospitals.

The patient was a full-term baby who had been born without difficulty. He is healthy in body. He did well in both primary and middle school, where he was fond of reading picturebooks. There is nothing abnormal in his family history. He is meticulous to a fault, and when he reads he pays excessive attention to pronunciation. He studies earnestly, but he is somewhat inclined to be concerned with the unimportant. He is pessimistic about the future.

The patient speaks logically, to the point, and with lucidity. He possesses good self-knowledge and has a normal sense of direction. He earnestly sought therapy.

In view of the patient's obsessive notions and obsessive checking behavior, his emotional tenseness, and the appearance of autonomic nervous symptoms, plus the patient's own statement that he has been obsessed with planning to harm others, he was preliminarily diagnosed as an obsessive compulsive neurotic.

In July 1979, the patient began to undergo behavior correction therapy. Except for an interruption in therapy caused when he visited a relative midway in the therapy, his therapy lasted for somewhat more than 2 months. Though this was a short period of time, while the patient was undergoing exercises, he mastered methods quite rapidly and results showed quickly. By the end of September, he had stopped using tranquilizers. He began to stop too quickly, so he still had withdrawal reactions. Subsequently he gradually reduced the amount until he quit entirely. He has completely stopped using all medicines as of now. His condition has taken a marked turn for the better. Each time he exercises, his headache disappears, and he is able to control and to eradicate obsessive notions and checking behavior. His insomnia, palpitations, and nauseous vomiting have virtually disappeared. He is able to go to work and live normally. A major problem remaining is his interest in his work. He still wants those in charge to find a suitable solution to this problem.

Case 3. Female, 26 years old. University graduate. Unmarried. Came to hospital for diagnosis in early 1978 suffering from obsessive notions and obsessive actions. Following graduation in 1975 from medical school, the patient had been uninterested in medicine. Her schoolwork had not been good, and when assigned to gynecological and obstetrical work, she became very tense and her dread psychology became serious. At work, she dared not give inoculations. When she held the needle in her hand, her hand trembled. She was afraid of administering the wrong drug, checking repeatedly to make sure, but even after checking, she continued to worry. As early as 1970, the patient had joined the army and had been sent to Tibet where she had become close friends with a male in the same unit and for whom her feelings had become very deep. But the patient's parents were greatly opposed, so by using the pretext of her young age [her parents] had them separated.

The patient became greatly upset as a result, and this event has been the major source of her anguish and recollections for a long time. Since 1979, she has exhibited some ritualized obsessive behavior. She folds her quilts and folds her clothes for long periods of time according to a rigid sequence in a very strange and slow behavior. After going to the toilet, she has to turn her head in many directions to make a check before leaving the toilet. She thinks constantly about her former boyfriend. Though she knows quite well that he has married and has a child, she is unable to restrain herself. The image of the man is etched in her brain, so much so that her work was impaired and she entered a hospital in November 1975. There, following diagnosis of schizophrenia, she was given chlorpromazine for treatment. But since the patient was aware this medicine produced side-effects, she was averse to taking the chlorpormazine. In February 1976, she left the hospital to recuperate at home for more than 2 months. The hospital sent her to physiotherapy, but the symptoms were in no way reduced by the process. She was unable to rid herself of the obsessive thoughts, and the physiotherapy seemed to intensify the frequency of her obsessive ritualistic behavior.

The patient was born after the normal period of gestation and without difficulty. She grew normally and was an average student in primary school, where she had a skin allergy. Physical examination showed her normal in every other way. The patient's family has no history of special illnesses. Her father has a grouchy disposition. The patient's family circumstances have been superior ever since her childhood. She was pampered from childhood and is willful. For a long period as a child, she lived alone with her father, and as a result of her father's strict training, she became timid and fearful. Reclusive by temperament, she likes to sulk and is hypersensitive. She has never liked sports activities.

In mid-1979, the patient underwent behavior correction therapy. Early on, following several psychological therapy sessions in which the causes of her illness were analyzed and she was talked to about mental health, the patient very quickly corrected her stubborn attitude about love, and after understanding herself and realities, she indicated a desire to transfer the object of her affection. With this proper understanding as a basis, the patient became extremely active in learning heartrate feedback and relaxation techniques. At the same time, through systematic desensitization, the patient gradually resolved her dread psychology toward her specialty and the obsessive ritualistic behavior in her daily life. Subsequently, she learned through dynamic yishou to control and stop unrealistic obsessive fantasies. The effects of the above behavior training methods were very marked. The patient took the initiative at the outset of the exercises to stop taking medicine, and now her condition has made a striking turn for the better. She is able to work and live normally, and after having been introduced to male friends by relatives, she is able to have a normal love life. A followup interview on the telephone showed all was well.

Discussion

Psychological therapy is the major link in behavior-correction therapy. The total therapy may be regarded as having two stages. The first stage is an increase in cognitive ability. Once the patient understands the reasons for his illness and the principles underlying therapy, the initiation of suitable behavior exercises is easier. The second stage is an increase in control ability. Following repeated exercises, the patient learns to reduce his heartrate and to relax his skeletal muscles, to use yishou methods to transfer and stop obsessive fantasies and obsessive feelings, and gradually to form new habits. Thus, the former is cognition study, and the latter is study to stimulate and cause the formation of new, connected, habitual behavior. Neither stage can be omitted.

The goal of this outpatient training was merely to teach a set of methods. Twenty minutes of decreased heartrate and improvement in emotional symptoms are only temporary, and the effects are not permanent, so the patient and the doctor must make an unambiguous evaluation. Only when the patient makes these methods and principles a part of his life and his work can the individual shortlived benefits begin to accumulate, so that he will have enduring benefits from the therapy. Consequently, following the second course of therapy, the patient should gradually reduce his dependence on the measuring instruments in order to conduct the exercises by himself and make a self-evaluation. With a dramatic change in circumstances, control of emotional fluctuations also becomes possible. Thus, successful therapy requires that the patient himself play the main role in the therapeutic process.

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LIFE SCIENCES

REPORT ON TRIAL USE OF MMPI IN SOME PARTS OF CHINA

Beijing ZHONGHUA SHENJING-JINGSHENKE ZAZHI [CHINESE JOURNAL OF NEUROLOGY AND PSYCHIATRY] in Chinese Vol 13, No 3, Sep 80 pp 157-160

[Article by Song Weizhen [1345 4850 4176] and Zhang Yao [1728 3852], Institute of Psychology, Chinese Academy of Sciences; and Yang Huayu [2799 5478 3254], Beijing Anding Hospital: "Report on Trial Use of Minnesota Multiphasic Personality Inventory in Some Parts of China"*]

[Text] The Minnesota Multiphasic Personality Inventory (hereinafter termed MMPI) is a form of self-reporting inventory. In the more than 30 years since this inventory was drafted by the Americans Hathaway and McKinley in the early 1940's, it has been translated into the local language of many countries and applied to research work in anthropology, psychology, and medicine, and has found particularly widespread application in clinical diagnosis of psychoses. Test results in every country have demonstrated that this inventory has definite value for its reliability and applicability in the testing and classification of psychoses.[1] China has yet to witness a report on such research.

By way of exploring whether or not MMPI is applicable to China and, if applicable, whether revisions should be made we conducted an examination of 132 normal people and 92 schizophrenic patients. A report on the circumstances of the testing is given below.

I. Test Methods and Test Circumstances

1. Test Methods. MMPI was conducted abroad both through the use of individual cards and through the use of a manual, with the manual being used for group

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*This work was conducted under the guidance of Professor Lin Chuanding [2651 0278 7844]. Participants in the work included Deputy Professor Chen Zhongkeng [7115 0112 1649], Zhang Boyuan [1728 0130 3293], and Zhou Yin [0719 5419] of Beijing University; Wang Dong [3769 2767], and Fu Weichen [0265 4885 5265] of the Tianjin Psychiatric Hospital; Cui Qiukeng [1508 4428 5087] of the Psychological Institute, Chinese Academy of Sciences; and Liu Xiaocong [0491 1420 5115] and Lu Meixia [7120 5019 7209], Beijing Anding Hospital.

testing. (1) In the card method, 566 cards were used, of which the content of 16 was duplicatory. On each card was printed a single sentence describing a person—i.e., the so-called subject. The person being tested is allowed, on the basis of his personal situation, to deposit each subject card in one of three boxes, marked "Yes" (indicating it pertains to his individual situation); "No" (indicating it does not pertain to his individual situation); or "undecided." The person being tested is urged to use the "undecided" box as little as possible, and not more than nine times at most. (2) In the manual method, 566 subjects are printed in a book, and an answer sheet corresponding to the subjects is provided. On the sheet are printed the words "Yes" and "No"; the person being tested is to make a mark on the basis of his personal situation with regard to each subject, marking either "Yes" or "No." In cases where he is undecided on a reply to the subject, he is to make no mark at all.

In 1966, this inventory was revised and is known as MMPIR. The method of use for the revision is the same as for the previous version, and no change was made in its contents. Only the sequencing of subjects was rearranged, with the most frequently used scales centralized in topics 1 to 399. This is a convenience in scoring but does not impair reliability. At the time of use, a mark is recorded for each subject on the basis of scoring keys for 14 scales. The first four of these are validating scales, and the remaining 10 are clinical scales, which are now marked as follows:

Validating Scales:

Q--Questionable grade. Total number of times answer given as "undecided" is the criterion. High score indicates person tested escapes from reality.

L--Lying grade. High score indicates replies not truthful.

F--Feigning illness score. High score indicates intentional feigning of illness, seriously paranoid, incorrect scoring, or carelessness in making replies.

K--Compensation score. High score indicates subtle defense reaction.

Clinical Scales:

Hs--Hypochondriasis
D-- Depression
Hy--Hysteria
Pd--Psychopathic deviate
Mf--Masculinity-femininity
Pa--Paranoia
Pt--Psychasthenia
Sc--Schizophrenia
Ma--Hypomania
Si--Social Introversion

In addition to the above 14 scales, there are also Es (ego strength), Dy (dependency), Do (dominance), and Pr (prejudice), among others. Most are directly related to pathology, and so of the 566 topics on the complete form, 400 through 566 are useless for our research purposes.

The R form was used in this research, and for the subjects used, Hong Kong Chinese University's translation was used for reference. [2] In order to facilitate comparison with conclusions from abroad, no major changes were made in content; revisions were made to individual words only.

Analysis of results was entirely in accordance with methods recommended by Hathaway. There was a division into male and female groups, with the raw scores for each scale being figured first. To the Hs, Pd, Pt, Sc, and Ma scales were added the corresponding K compensation scores, and these were converted to the T scores for each scale. The purpose of adding the compensation numbers was to increase the differentiation among the five scales. According to Hathaway, the K scores to be added should be (1) Hs + 0.5 K; (2) Sc + 1.0 K; (3) Pd + 0.4 K; (4) Ma + 0.2 K; and (5) Pt + 1.0 K.

$$T = 50 + \frac{10\ (X - M)}{SD}$$

In the formula, X stands for raw score; M is the mean score; and SD is the standard deviation. Since the sampling was quite small in this study, following precedent established abroad, prior to enlarging the scope the conversion of the T score temporarily used the original MMPI table, with which a T score in excess of 70 was usually abnormal.

Inasmuch as the principal objective of this test was to explore whether or not MMPI is applicable to China, conclusions were not drawn for every person tested; consequently, in the analysis of conclusions, fullest use was not made of the various indicators in the validating scales (for example, throwing out materials when the material had Q scores in excess of 9, and cases in which answers to duplicated questions were not the same more than four times). Instead, a full analysis was made of all data.

II. Test Circumstances

1. Normal Group. As tables 1 and 2 show, on the clinical scales the D and Sc scale marks for the normal male group were fairly high.

2. Schizophrenic Group. As tables 3 and 4 show, on the clinical scales, the D, Pt, and Sc scale scores for the male patients group were high, and the PA and Sc scale scores for the female patients were quite high, all of them exceeding 70. The Sc scale was particularly conspicuous.

3. A comparison of the normal group with the schizophrenic group: It may be seen from an analysis of the test results for these two groups that on the clinical scales, in the case of both the males and the females, that following t texting of the raw scores of the Pa and Sc scales, there was a conspicuous difference (tables 5 and 6, and plates 1 and 2)

Table 1. Mean Scores on Each Different MMPI Scale for 62 Normal Males

	Raw Scores	Raw Scores + K	T Scores (+ K)
	Mean Score ± Standard Deviation	Mean Score ± Standard Deviation	
Q	4.58 ± 2.82		43
L	7.18 ± 2.94		60
F	12.47 ± 4.19		73
K	12.82 ± 4.56		51
Hs	8.16 ± 4.72	14.90 ± 5.06	59
D	27.63 ± 5.29		77
Hy	21.53 ± 5.60		60
Pd	18.37 ± 4.72	23.47 ± 4.35	62
Mf-m	27.73 ± 4.01		65
Pa	12.34 ± 3.38		62
Pt	17.16 ± 7.95	29.82 ± 5.74	64
Sc	20.81 ± 8.76	33.63 ± 6.99	73
Ma	18.00 ± 4.93	21.08 ± 5.16	60
Si	33.63 ± 8.14		61

Table 2. Mean Scores on Each Different MMPI Scale for 70 Normal Females

	Raw Scores	Raw Scores + K	T Scores (+ K)
	Mean Score ± Standard Deviation	Mean Score ± Standard Deviation	
Q	5.07 ± 3.78		43
L	7.23 ± 3.07		60
F	12.57 ± 4.97		73
K	12.76 ± 4.92		51
Hs	9.84 ± 5.62	16.47 ± 5.68	58
D	29.19 ± 4.96		69
Hy	21.83 ± 6.12		57
Pd	17.21 ± 4.76	22.29 ± 4.41	57
Mf-F	32.31 ± 4.19		59
Pa	11.79 ± 4.42		62
Pt	18.23 ± 8.18	30.87 ± 5.28	60
Sc	22.06 ±10.48	35.03 ± 7.48	69
Ma	17.01 ± 4.98	19.61 ± 4.47	58
Si	36.91 ± 7.69		64

Table 3. Mean Scores and Standard Deviation on Each MMPI Scale for 47 Schizophrenic Male Patients

	Raw Scores	Raw Scores + K	T Scores (+ K)
	Mean Score ± Standard Deviation	Mean Score ± Standard Deviation	
Q	5.74 ± 5.18		43
L	7.71 ± 3.29		63
F	15.34 ± 6.64		78
K	14.62 ± 5.93		55
Hs	9.40 ± 4.90	16.87 ± 5.86	65
D	27.96 ± 4.83		77
Hy	22.83 ± 6.27		62
Pd	18.89 ± 4.78	24.38 ± 4.78	64
Mf-m	26.53 ± 4.71		63
Pa	15.19 ± 4.31		70
Pt	19.77 ± 9.23	34.36 ± 5.50	73
Sc	26.62 ± 11.61	41.00 ± 7.43	86
Ma	18.68 ± 5.25	21.77 ± 4.37	63
Si	32.77 ± 6.85		60

Table 4. Mean Scores and Standard Deviation on Each MMPI Scale for 45 Schizophrenic Female Patients

	Raw Scores	Raw Scores + K	T Scores (+ K)
	Mean Score ± Standard Deviation	Mean Score ± Standard Deviation	
Q	5.42 ± 4.80		43
L	7.96 ± 2.66		63
F	15.87 ± 6.13		80
K	14.16 ± 4.78		53
HS	9.56 ± 5.18	16.89 ± 5.21	58
D	29.44 ± 6.06		69
Hy	23.16 ± 6.30		57
Pd	18.56 ± 4.76	24.04 ± 4.98	62
Mf-f	29.31 ± 4.25		66
Pa	15.91 ± 4.74		73
Pt	21.16 ± 8.10	35.62 ± 5.63	68
Sc	27.04 ± 11.02	40.8 ± 8.27	78
Ma	18.51 ± 5.88	22.29 ± 5.52	63
Si	34.49 ± 6.67		61

Table 5. Comparison of MMPI Clinical Scale Raw Scores for Normal and Schizophrenic Patients (Males)

	Normal People (62)	Patients (47)	t value		Normal People (62)	Patients (47)	t value
Hs	8.16	9.40	1.348	Pa	12.36	15.19	3.900*
D	27.63	27.96	0.337	Pt	17.16	19.77	1.591
Hy	21.53	22.83	1.146	Sc	20.81	26.62	2.995**
Pd	18.37	18.89	0.571	Ma	18.00	18.68	0.723
Mf-M	27.73	26.53	1.446	Si	33.63	32.77	0.587

* $P < 0.001$ ** $P < 0.01$

Table 6. Comparison of MMPI Clinical Scale Raw Scores for Normal and Schizophrenic Patients (Females)

	Normal People (70)	Patients (45)	t value		Normal People (70)	Patients (45)	t value
Hs	9.84	9.56	0.267	Pa	11.79	15.91	4.763*
D	29.19	29.44	1.042	Pt	18.23	21.16	1.866
Hy	22.83	23.16	0.277	Sc	22.06	27.04	2.42 **
Pd	17.21	18.56	1.378	Ma	17.01	18.51	1.458
Mf-f	32.31	29.31	3.704*	Si	36.91	34.49	1.721

* $P < 0.001$ ** $P < 0.05$

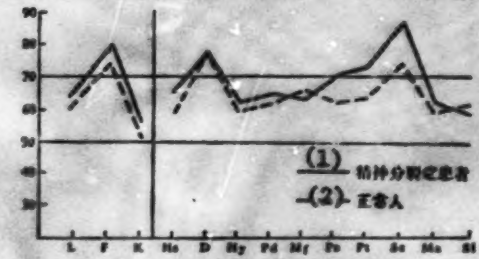

Plate 1. Male Test T Score Graph

Key:
(1) Schizophrenic patients
(2) Normal people

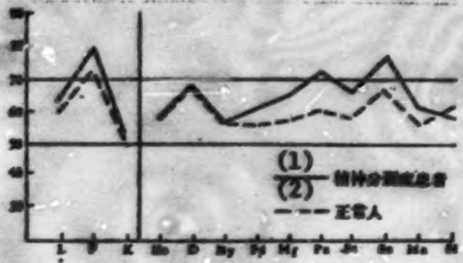

Plate 2. Female Test T Score Graph

Key:
(1) Schizophrenic patients
(2) Normal people

4. Duplicate Testing. As is shown in Table 7, apart from the fact that the relative coefficient of Pa was not very striking, the reliability of all other 13 scales were highly striking.

Table 7. Reliability of MMPI Scale Retesting of Normal People

	Relative Coefficient	P Value		Relative Coefficient	P Value
L	0.889	$P < 0.001$	MF-M	0.845	$P < 0.001$
F	0.914	$P < 0.001$	Mf-f	0.825	$P < 0.001$
K	0.683	$P < 0.005$	Pa	0.658	$P < 0.01$
Hs	0.820	$P < 0.001$	Pt	0.955	$P < 0.001$
D	0.853	$P < 0.001$	Sc	0.849	$P < 0.001$
Hy	0.670	$P < 0.01$	Ma	0.925	$P < 0.001$
Pd	0.480	$0.05 < P < 0.1$	Si	0.859	$P < 0.001$
			Mean Score	0.802	

Discussion

1. It may be seen from an analysis of the data that in the testing process, if the tester is able to explain clearly to the person being tested the matters requiring attention in the test, most persons tested can reduce to less than nine the number of their "undecided" replies (i.e., the Q scores). On this particular test, the average number of "undecided" replies did not exceed six for either the normal or the schizophrenic patients. In fact, in only 10 cases (7.6 percent) did "undecided" replies from the normal people exceed 9. Replies of "undecided" exceeded 9 in a total of 15 cases (15.2 percent) for the schizophrenic patients, and subjects for which this reply was made pertained mostly to problems of sex. For those tested who were not married, an answer was in fact difficult. In addition, we conducted retesting twice on 15 normal people. The relative coefficient in the double-testing results was highly remarkable for all scales except the Pd scale, which was not outstanding, showing that this test has definite reliability. From this it may be seen that, following revision, this inventory may be applied in China.

In the clinical scales for normal people tested, the marks for the D and Sc scales were higher than for other scales, particularly for males. The T score for these two scales exceed internationally established normal limits. This is similar to the results obtained in Hong Kong[2] and Japan.[1] As Butcher et al[1] have said, this situation is possibly related to the translation of words and to differences between Oriental and Occidental customs and habits.

3. When an analysis was conducted of the results of testing of the schizophrenic patients, we saw that on the clinical scales, patients both male and female had T scores for Sc and Pa greatly in excess of usual levels. After t testing, the difference in the raw scores was striking (tables 5 and 6 and plates 1 and 2),

while the other scales were not striking except for Mf. Reasons why the scores for female schizophrenic patients on the Mf scale were higher than for normal people of the same sex await further analysis. For these reasons, we feel that these tests have high value for reference in the clinical diagnosis of psychoses, and of paranoid schizophrenia in particular.

4. It was discovered in the course of testing that as a result of differences in social culture and living habits, many of the subjects on the inventory do not suit the situation in China. Questions about religion, questions about sex, and questions about employment, for example, the persons being tested found difficult to answer. At the same time, how to change the wording to suit China's habits while avoiding inverted sentences and double negative sentences that might easily lead those being tested to misunderstand are matters requiring our profound exploration and solution.

The goal of this testing was only to furnish a preliminary exploration of whether or not MMPI is suitable for use in China. Because of the limited number of places and the small number of people that have been tested up till now, we must await a larger volume of testing research in various places throughout the entire country.

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LIFE SCIENCES

ESTABLISHMENT OF EYE BANK SAID URGENTLY NEEDED

Beijing GUANGMING RIBAO in Chinese 3 Oct 80 p 1

[Text] Most recently the author, Peng Zhouxian [1756 0719 6343], paid a visit at the Ophthalmological Hospital of Zhongshan College of Medicine and felt profoundly the need for quickly establishing an eye bank.

The Ophthalmological Hospital of Zhongshan College of Medicine is a specialized hospital of the largest scale in China, and is also the hospital demonstrating a relatively obvious treatment effect of corneal diseases in recent years. In such a hospital, there is no eye bank, however. An eye bank is a place to collect and preserve eyeballs. It is a basic facility for scientific research, clinical treatment of the blind, and for the care of eye diseases. Some advanced countries established eye banks as early as the 1940's. At present, not a few Third World countries, such as Sri Lanka, have also established eye banks of their own.

In China, a number of medical units made progress in corneal transplant in the 1950's. Due to the fact that the source of cornea was uncertain and there was no eye bank, the project had to be discontinued in many units. The Corneal Disease Group of the Ophthalmological Hospital of Zhongshan College of Medicine is composed of four physicians only, including Prof Du Nianzu [2659 1819 4371]. In order to obtain corneal materials, they have to secure the support of all the hospitals and to go to fetch the cornea immediately whenever a willing donor is found. In the past 2 decades, under this condition of extreme deficiency of materials they treated a total of 1,800 patients coming from all over the country as well as overseas. In recent years, a number of world famous eye specialists have come to observe their work and exchange experience. These specialists were expressedly impressed by the achievement of this group in corneal transplant when the work had to proceed under such difficult conditions.

During last year's National Congress of Ophthalmology, a National Corneal Diseases Prevention and Treatment Cooperative Group to be in charge of that hospital was officially established. During the meeting, many delegates proposed the establishment of China's first eye bank at that hospital in order to promote the country's work of preventing blindness. The establishment of the eye bank has not been implemented to this day, however.

Prof. Du Nianzu and his assistants, who are responsible for a rapid development of theoretical research of ophthalmology in China to bring this field to the advanced level of the world, hope the leadership departments will pay attention to the problem and help to resolve it quickly so that such a large country as ours with a population of 1 billion definitely has a claim in this important field of prevention and treatment of blindness.

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NEW ADVANCES MADE IN GASTRIC CARCINOMA RESEARCH

Beijing GUANGMING RIBAO in Chinese 11 Oct 80 p 1

[Text] It has been announced here that China's first strain of human gastric cancer cell line has been established in Shanghai, and it has been identified this afternoon. This cell line was established through more than a year's joint efforts by Shanghai Municipal Sixth People's Hospital, the Department of Biology of Fudan University. Shanghai Municipal Institute of Oncology, and Shanghai Municipal Bureau of Public Health. At present, that line has been stably cultured to the 73rd generation (a minimum of 30 generations are needed for the cell to have value for research.) Inoculation in animals has also been successful. This achievement marks a forward step of China's research work on gastric carcinoma, and is an important fruit of scientific research in its goal of catching up and surpassing the advanced level of the world in the field of prevention and treatment of tumors.

Incidence of gastric cancer is the highest among malignant tumors in China, and its mortality rate is one of the highest. The establishment of a gastric carcinoma cell line provides an important condition for looking for a convenient, reliable, and new immunological method of its diagnosis. Furthermore, it is also significant in such aspects of basic research as drug selection, the science of structure and morphology of cells of gastric carcinoma, etc.

In May 1979, the Shanghai Municipal Sixth People's Hospital and the Institute of Genetics of Fudan University obtained a piece of cancer tissue from a female victim of gastric carcinoma and proceeded with extra-corporal culture. Through such techniques as microscopic observation and microscopic photography, they discovered that the cultured cell possessed the characteristic structure of malignant cells. In May of this year, the researchers of Shanghai Institute of Pharmacology, Chinese Academy of Sciences inoculated the cultured cancer cell to the anterior chamber of the eye of rabbits and in the hypodermic tissues of white mice. Success was obtained. It was also discovered that the tumor produced after hypodermic inoculation in white mice demonstrated localized lymphatic metastasis and the condition of infiltration of cancer cells in the muscular layer. The Institute of Pharmacology, the Sixth People's Hospital, and the Department of Biology of Fudan University used the extra-corporal cultured cells and the tumor formed on the animals to proceed with pathological observation, electron microscopic examination, and histochemical study to determine that they are truly gastric carcinoma cells. At present, the gastric carcinoma cell line is preserved in liquid nitrogen, and the resuscitation rate is as high as 98 percent.

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Automatic Monitoring and Control of Power Systems (serial). 3. Security Control of Power Systems......Han Zhenxiang [7281 4394 4382], Zhejiang University (60)

Computer Programming for Beginners (serial). 4. Structure of Computers......Fu Hongcang [0265 7703 3318] (76)

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TITLE: "A New Variety of *Bacillus thuringiensis* Berliner"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 1-5

TEXT OF ENGLISH ABSTRACT: A parasporal crystal forming bacillus "7216" was isolated from dead *Pectinophora gossypiella* Saunders in 1972. This bacillus has the typical characteristics of *Bacillus thuringiensis*. Its serotype belongs to H_3, but it is distinguished from the varieties *alesti* and *kurstaki* in cultural characteristics and biochemical reactions. This bacillus is, therefore, considered to be a new variety and the trinomial *Bacillus thuringiensis* var. *tianmensis* (7216) is proposed.

Bacillus thuringiensis var. *tianmensis* (7216) is easy to cultivate by industrial fermentation and to be used as an insecticide. It is more effective in the control of *Pectinophora gossypiella* than is any other microbiol insecticide commonly used in China.

Type culture of this new variety is deposited in Tianmen Institute of Microbiology, Hubei, China.

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TITLE: "A New Species of *Streptomyces* Producing Streptonigrin"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 6-9

EXCERPT OF ENGLISH ABSTRACT: While screening new antitumor antibiotics, a species of *Streptomyces* designated as No 74-3527 was isolated from a Xishuangbanna soil sample. According to the UV, IR and NMR spectra; this strain produces an antitumor antibiotic which is identical to Streptonigrin formed by *Streptomyces flocculus*. Taxonomic studies show that the strain No 74-3527 is a new species among the *Streptomyces cinereogriseus* group and was named *Streptomyces streptonigrinus* n. sp. Yan et al. 1977.

AUTHOR: LU Yunyu [4151 6663 3768]

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TITLE: "Numerical Taxonomic Study on 55 Streptomyces Strains"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 10-15

TEXT OF ENGLISH ABSTRACT: 1. By means of numerical taxonomic methods, 55 strains of Streptomyces were analyzed with 50 characteristics being examined. When the similarity percentage is at a level beyond 84 percent, four groups may be distinguished, i.e., Streptomyces groups of glaucus, lavendulae, cyaneus and aureus.
2. Taxonomic relation diagrams were made from the similarity values which showed the relationships among these groups. The results obtained are compatible with those from traditional taxonomy.
3. From the taxonomic chart of this paper, one might visualize that the various colors of spores of Streptomyces cultures are distributed regularly. Cultures of similar colors run into the same group. It seems to justify the fact that spore colors are a stable characteristic and merit attention in taxonomy.

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TITLE: "New Rust Fungi from Western China"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 16-28

TEXT OF ENGLISH ABSTRACT: In 1975-1976, the Commission of Integrated Survey of Natural Resources, Chinese Academy of Sciences, organized two comprehensive scientific expedition trips to Xizang (Tibet) and Xinjiang (Chinese Turkestan). Mycological workers participated in the expeditions. Many specimens of fungi were collected and lists of fungi identified from these regions have been prepared and will be published elsewhere. In this paper 15 new species of rust fungi collected from these regions are reported. Among these new rusts some are distinguished from those found in coastal regions. Chrysomyxa stilbae Wang, Chen et Guo n. sp. e.g., has its telia very much like those of the authentic Chrysomyxa. It has, however, a stilbum-like hyphae-bundle stalk somewhat like a sporophore at the

[Continuation of WEISHENGWU XUEBAO Vol 20 No 1, 1980 pp 16-28]

base of the telial head. The hyphae-bundle stalk which measured from 0.5 to 1 mm raises the telial head above the leaf surface. Balfour-Brown, in a paper on Himalayan Fungi, stated: "The teleutosori of *Chrysomyxa* spp. on Asiatic Rhododendron species form a series showing a gradual difference in size from the small, sessile *C. diste1ii*, through the somewhat larger, still sessile, *C. taghishae* and the shortly stalked forms of *C. himalense*, from Simla and Nepal, to the large, long-stalked Tibetan forms (Taylor 4324) of this latter species. Experimental work can only decide whether these forms do, in fact, represent distinct species or merely growth responses of the different species of host plant." On reexamination of a specimen from Qinghai (HMAS 24398) named by the senior author as *C. rhododendri* deposited in this Herbarium, the present authors found that it also has a stilbum-like hyphae bundle beneath the telial head. This Qinghai specimen coincident with *C. succinea* (Sacc.) Tranz. is therefore verified. The present new species from Xizang is further distinguished from other *Chrysomyxa* mentioned above in having larger teliospores and longer teliospore-chains.

In naming the new fern rust, *Uredo pseudocystopteridis*, the authors seriously considered Article 59 of the International Code of Botanical Nomenclature (1972). Having strictly followed this article, the authors have denominated it to the form genus Uredo. Otherwise, it might have been named under the generic name *Hyalopsora* since this fern rust does have colored uredinial spores readily distinguishable from the other two genera *Uredinopsis* and *Milesina* on ferns.

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Spore states, such as uredinial, in the genus *Hyalopsora* which can be used to ascribe the organism to the correct genus of the perfect state should be legitimated and the generic name of the perfect state could be used in the case of a specimen not provided with the telial state. Of course, it would be preferable to make a proposal to the Nomenclature Committee of the International Botanical Congress and the International Mycological Congress for a decision in the coming meeting.

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TITLE: "Some New Species of Basidiomycetes from the Xizang Autonomous Region of China"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 29-34

TEXT OF ENGLISH ABSTRACT: The mycoflora of the southeastern area of Xizang (Tibet) is very rich and complex. Among the many fungous specimens collected by the author during his investigations to this region, five new species of Basidiomycetes are identified:

1. *Boletinus lignicolus* Zang: Closely related to *Boletinus punctatipes* Snell et Dick, but differs in its glabrous stipe, larger basidiospores (4.9 - 6.2 x 12 - 14.8 μm) and its lignicolous habitat, especially the parasitism on *Pinus densata* Mast.
2. *Boletus magasporus* Zang: Found in swampy forests. Distribution of this species seems to be limited to both sides of the Nuchiang River in Yunnan Province and the southeastern region of Xizang. It resembles *Boletus puniceus* Chiu in appearance, but differs in that the stipe of the new species is smooth and the basidiospores larger (7 - 8.5 x 18 - 20 μm) and it tastes bitter.
3. *Cantharellus tuberculosporus* Zang: Characterized by its larger size of basidiocarp, the bright yellow color of pileus and hymenophore, and the tuberation of

[Continuation of WEISHENGWU XUEBAO Vol 20 No 1, 1980 pp 29-34]

spores, which distinguish this new species immediately from *Cantharellus yunnanensis* Chiu.

4. *Lycoperdon fusiforme* Zang: Closely related to *Lycoperdon muscorum* Morg., but differs from it in its spindle-shaped basidiocarp and its smaller basidiospores (2.4 - 3.7 μm in diameter).
5. *Cyathus discoideus* Zang: Remarkable for the fact that the stipe of its basidiocarp possesses a disc-like base which discriminates this species from *Cyathus olla* (Batsch) Pers. as well as from other species in the same genus.

AUTHOR: ZHENG Ruyong [6774 0320 3057]
CHEN Guiqing [7115 2710 3237]

ORG: Both of the Institute of Microbiology, Chinese Academy of Sciences, Beijing

TITLE: "Taxonomic Studies on the Genus *Sawadaea* of China. I. Recognition of the Genus *Sawadaea* and the New Species and New Combination on Aceraceae and Hippocastanaceae"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 35-44

TEXT OF ENGLISH ABSTRACT: Reasons for the recognition of the genus *Sawadaea* Miyabe have been fully discussed and the conclusion is that since both the perfect and imperfect states of this genus differ greatly from the genus *Uncinula*, it is rational to segregate this group of powdery mildews from the genus *Uncinula* and to recognize it as an independent genus. Six species of *Sawadaea* are collected from China, including all four of the known species formerly reported and two other new species. They are: *Sawadaea tulasnei* (Fuck.) Homma, *Sawadaea negundinis* Homma, *Sawadaea bicornis* (Wallr. ex Fr.) Homma, *Sawadaea polyfida* (Wei) comb. nov., *Sawadaea bomiensis* sp. nov. and *Sawadaea aesculi* sp. nov. Whereas the first five species are parasitic on *Acer* (Aceraceae), the sixth and last species is parasitic on *Aesculus* (Hippocastanaceae). This is the first record of the ascus state of *Sawadaea* on a new host family other than Aceraceae. The discovery of the conidial

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state of *Sawadaea tulasnei* (Fuck.) Homma is also the first record of the imperfect state of *Sawadaea* from China. A key to the species is presented. Chinese and Latin diagnoses for the new species, Chinese diagnoses for the new combination and the imperfect state of *Sawadaea tulasnei* (Fuck.) Homma are given. Differences between related species are also discussed.

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TITLE: "Taxonomic Studies on the Genus Erysiphe of China. I. New Species and New Variety of Caprifoliaceae"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 45-49

TEXT OF ENGLISH ABSTRACT: Two new taxa of Erysiphe parasitizing on Caprifoliaceae, i.e., Erysiphe abeliae sp. nov. on Abelia sp. collected from Sichuan Province, and Erysiphe sambuci Ahmad var. crassitunicata var. nov. on Sambucus adnata Wall. collected from Xizang Autonomous Region (Tibet), are described.

Erysiphe abeliae sp. nov. is a very interesting powdery mildew. Nearly all of its appendages are typical of the Erysiphe-type, but one appendage among approximately 500-1000 appendages may be found to be typical of the Uncincla-type. This phenomenon reveals the close relationship between these two genera. The authors think that the discovery of this fungus lends great support to the view that the genus Uncinula is developed from the genus Erysiphe concerning the phylogeny of the powdery mildews.

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Latin and Chinese diagnoses are given for the new species and the new variety. Reasons for erecting these new taxa are also discussed.

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TITLE: "Morphology and Structure of Several Tailed Phages"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 50-53

TEXT OF ENGLISH ABSTRACT: Several distinct types of tailed phages on six host strains, namely, Streptomyces kanamyceticus, Streptomyces aureofaciens, Xanthomonas oryzae, Corynebacterium crenatum, Bacillus polymyxa and Bacillus thuringiensis, belonging to groups A, B and C according to Bradley, were studied for their morphology with special reference to the heads and tail-ends. It is of special developmental importance to compare tail-end structures among phages from different sources. It is convenient to make precise descriptions of head structures by PTA-negative staining as well as by interpretive geometric configurations from electron

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micrographs, both of which are discussed in detail. In addition, on the basis of its peculiar tail-end structure, phage TP35 on Bacillus thuringiensis should be recognized as a new type.

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TITLE: "Studies on a Heteroplasmic Mutant of Streptomyces aureofaciens Induced by Colchicine"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 54-59

TEXT OF ENGLISH ABSTRACT: 1. In comparing the mutagenic effect of colchicine with that of ultraviolet, nitrogen mustard and acriflavine for inducing heteroplasmic mutation, only colchicine yields a satisfactory result.
2. The heteroplasmic mutant has larger conidia with more germ tubes during germination than does the original strain.
3. In colony formation every colony of the heteroplasmon showed morphological persistent segregation, thus producing two or more normal sectors. Conidia from the central part of the heteroplasmic colony possessing the morphological persistent segregation form heteroplasmic colonies, while conidia from the normal sectors formed only heteroplasmic normal type colonies. It thus suggests that there are two kinds of cytoplasmic determinants in the heteroplasmic conidia.

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4. The non-recovery of a pure-breeding mutant in a heteroplasmic colony further suggests that the mutated gene is due to the lethal substances in the homoplasmic state.
5. The results of the heterocaryon test showed that the segregant with normal nucleus forms normal type colonies only, therefore suggesting that there is a special nucleocytoplasmic relationship between the mutated cytoplasmic gene and the nucleus. In addition, an unstable merozygote is screened out and the colonial morphology of the merozygote lies between the other two kinds of segregants, without showing any morphological persistent segregation. It further suggests that the phenotype of the mutated gene is inhibited by the normal nucleus in the merozygotic state.
6. The effect of the mutant cells under the exposure of ultraviolet radiation showed that this strain possesses greater resistance than does the normal type strain, but the killing curve of the mutant is quite different from that of the diploid or double-nucleus strain. It is therefore concluded that the increasing resistance of the mutant is due to the action of the cytoplasmic gene.

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TITLE: "In Vitro Reconstitution of Infectious Particles from Influenza Virus RNA and Influenza Virus Polymerase"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 60-67

TEXT OF ENGLISH ABSTRACT: 1. In vitro reconstitution of infectious particles from noninfectious influenza virus RNA and noninfectious cell-free enzyme-system extracted from influenza virus infected chorioallantoic membrane was reported. The particles, after being injected into the chorioallantoic cavities of 12-day chick embryos, resulted in virus multiplication.
2. Infectivity of the infectious particles was enhanced by prolonging the time of contact of the viral RNA with sodium phosphate buffer, pH 7.8, containing 0.5 M sodium chloride, or by heating it at 90°C for certain periods. Addition of DOC dissociated noninfectious virus materials also showed improved results, while the addition of DEAE-sephadex showed no beneficial effect.

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3. The results obtained in this experiment may, in some measure, illustrate the important role of protein in the life process of the influenza virus, and provide a possibility for obtaining variant strains from influenza viruses.

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ORG: All of the Beijing Forestry Institute, Beijing

TITLE: "The Observation and Identification of Entomophthora aulicae (Reich) Sorokin"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 68-71

TEXT OF ENGLISH ABSTRACT: The epidemic disease on larvae Arctiidae and other insects of Lepidoptera infected by entomogenous fungi was found in the Hot Spring region, Anning County (Kunming district), Yunnan in 1978. The pathogen has been identified as Entomophthora aulicae (Reich) Sorok. The identification of this causal agent was based on isolation, inoculation and pathological anatomy (paraffin section) of the infected Alphaea phasma.

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TITLE: "Parasitization of Cladosporium cladosporioides (Fres) de Vries on Citrus Red Mites"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 72-75

TEXT OF ENGLISH ABSTRACT: Cladosporium cladosporioides (Fres.) de Vries was found to parasitize the citrus red mite, Panonychus citri (McGregor), in Guangdong Province, China. The mortality of parasitized citrus red mites in the field varied with localities and collection dates ranging from 6.5 - 26.9 percent in an unsprayed orchard in Guangzhou to 10.0 - 81.0 percent in sprayed ones in Boluo County, Guangdong.

Pathogenicity tests were carried out with spore suspension in 0.5 percent tea bran solution at a concentration of 3.0 x 10^7 spores/ml. The mites began to die in 24 hours, the mortality rates being 62.3 percent, 88.1 percent and 97.2 percent in three, five and seven days respectively, while those of checks were 7.4 percent, 15.4 percent and 42.1 percent respectively. The dead mites with typical symptoms

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appeared in three days. The conidiophore bearing conidia in braching chains of the fungus were found to grow out from the bodies of the dead mites. There is strong evidence that this fungus parasitizes the citrus red mite.

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TITLE: "Studies on Zhengguangmycins. II. Isolation, Purification, Physico-chemical Characterization and Identification"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 76-81

TEXT OF ENGLISH ABSTRACT: The Zhengguangmycins, a complex of glycopeptide type antitumor antibiotics, is produced by Str. verticillus var. pingyanggensis n. var. This paper deals with the isolation, purification, physico-chemical properties and identification. Two major components, namely Zhengguangmycins A_2 and B_2, were isolated from the complex and identified as Bleomycin A_2 and B_2 respectively on the basis of their physico-chemical properties.

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TITLE: "Bacterial Leaching of Middle-Peer Nickel Ores"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 82-87

TEXT OF ENGLISH ABSTRACT: The Thiobacillus ferroxidans strain T-7, which was effective for extraction nickel, was isolated directly from acid mine water in middle-peer nickel sulfide ore. This microorganism was able to extract 70-80 percent of the nickel from the ore 20 percent pulp density in seven days. The extraction was only about 5-6 percent in the control. The rate of the nickel leaching with bacteria was 12-15 fold faster than that in the sterile control.

The leaching conditions were as follows: ore particle size - 160 mesh; pulp density 20 percent; temperature 32°C; inoculating quantity 10 percent; acid consumption of bacterial leaching process saved more than 50 percent as compared with that by acid leaching. The efficiency of bacterial leaching in the shaking flask was in agreement with that of the column airperge when ore quantities of 20-2000 g were used.

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Direct observation and determination of the bacterial action on the ore surface was carried out by the scanning electron microscope. Biological oxidation of the pentaladite has been investigated. The results obtained indicated that the bacteria may derive energy from the oxidation of sulfide to sulfite, which partially supplied the consumed acid during the bacterial leaching process. The nickel was extracted from the ore as bivalent nickel ion.

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TITLE: "Fermentative Production of Mixed Long Chain Dicarboxylic Acids from n-Alkanes. I. Screening, Mutation and Identification of the Microorganisms"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 88-93

TEXT OF ENGLISH ABSTRACT: During the study of alkane metabolism, it was found that considerable strains of yeasts can produce dicarboxylic acids.

Among more than 700 strains of yeasts tested, including 15 genera and some unidentified species, about one-half can produce dicarboxylic acids, and 21 strains yield more dicarboxylic acid than do the others. One of them is *Rhodotorula* sp., with some of the others being *Candida tropicalis*, *C. lipolytica*, *C. brumptii*, *C. parapsilosis*, *C. guilliermondii*, *C. melibiose* and *C. sake*. Two-thirds of them belong to *C. lipolytica* and *C. tropicalis*.

From these strains we selected *C. tropicalis* strains 1230 which yield shorter chain dicarboxylic acids, but scarcely yielded monocarboxylic acid from n-alkanes. In order to accumulate the dicarboxylic acids longer than 10 carbon atoms, strain 1230 was treated with Nitrosoguanidine and ultraviolet radiation.

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During the treatment the sebasic acid and dodecanedioic acid were used as the indicative media respectively. Colonies which can grow on complete media but not on this media were selected. A mutant strain U_{3-21} which can yield dibasic acids with chain lengths more than 10 carbon atoms from alkane mixture (C_{10}-C_{14}) has been obtained. The yield of dibasic acid is 2.43 percent, which is four times higher than that of the strain 1230. Mutant U_{3-21} can grow well on long chain alkanes, but cannot utilize dibasic acids, so that it can accumulate dibasic acids. After improvement of the fermentation conditions, a yield of over 6 percent dibasic acid was obtained.

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TITLE: "Isolation, Purification and Identification of the Antibiotic 4-215"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 94-99

TEXT OF ENGLISH ABSTRACT: Antibiotic 4-215 is produced by a strain of Nocardia sp. It shows a curative effect on bacterial blight of rice caused by Xanthomonas oryzae.

Antibiotic 4-215 has been crystallized as a colorless prism and it is an amphoteric compound, easily soluble in acid and alkaline water, moderately soluble in methanol and ethanol, but insoluble in acetone and other organic solvents. It gives negative reactions with ninhydrin, ferric chloride, 2, 4-dinitrophenyl hydrazine, anthrone Molisch's and Sakaguchi's reagents. Its molecular weight is 285 and the empirical formula is $C_{10}H_{13}N_5O_4 \cdot H_2O$, with a specific rotation of $[\alpha]_D^{20} = -35.5$ (C = 1% in 0.1 N HCl), $[\alpha]_D^{24.5} = -72.11$ (C = 1% in MeOH), melting point 141-142°C. The ultraviolet absorption spectra are as follows: λ max 234 nm ($E_{1cm}^{1\%} = 380$) and 295 nm ($E_{1cm}^{1\%} = 340$) (in 0.1 N HCl solution); λ max 295 nm ($E_{1cm}^{1\%} = 380$) (in neutral aqueous solution); λ max 235 nm ($E_{1cm}^{1\%} = 500$) and 305 nm ($E_{1cm}^{1\%} = 260$) (in 0.1 N

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NaOH solution). It is highly inhibitory against pathogen Xanthomonas oryzae and moderately so against Piricularia oryzae and Mycobacterium sp. 607.

According to its physical and chemical properties as well as biological characteristics, antibiotic 4-215 is identical to Formycin.

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TITLE: "A Study on the Large-Scale Preparation of HBsAg by Density-Gradient Zonal Centrifugation"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 100-107

TEXT OF ENGLISH ABSTRACT: In the literature, the usual methods for large-scale preparation of pure HBsAg involved two cycles of cesium chloride isopycnic banding and one cycle of sucrose rate zonal sedimentation. In our hands, however, this seemed inadequate because the HBsAg obtained usually contained traces of normal human serum proteins. A composite purification procedure has been worked out in our laboratory. It consists of pepsin digestion, DEAE-cellulose chromatography, floating type of cesium chloride zonal centrifugation and sucrose rate zonal centrifugation. It can give pure HBsAg with buoyant densities ranging from 1.19 to 1.23 g/cm^3 in cesium chloride gradient and from 1.15 to 1.16 g/cm^3 in sucrose gradient. Normal human serum proteins were undetectable in the purified HBsAg and three to four immunizations to guinea pigs and horses gave rise to monospecific

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anti-HBs sera. These verified its high purity. Electron microscopic studies revealed a monodispersed small spherical particle without detectable Dane particles or filaments.

Now, large quantities of HBsAg are produced by this composite procedure in our laboratory for the purpose of making an experimental Hepatitis B vaccine.

AUTHOR: None

ORG: None

TITLE: "Two Regulations of the China Committee for Culture Collections of Microorganisms"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 1, 1980 pp 108-112

TEXT OF ENGLISH ABSTRACT: The first conference of Culture Collection was convened by the National Sciences and Technological Commission of China and the Chinese Academy of Sciences in Beijing on 11-18 July 1979. One hundred fifty representatives from the Ministry of Agriculture, Ministry of Light Industry, Ministry of Health, Ministry of Education, Ministry of Commerce, Ministry of Forestry, Pharmaceutics Administrative Bureau and Chinese Academy of Sciences attended the meeting. Due to the understanding of the country-wide importance of culture collections, the China Committee for Culture Collections of Microorganisms (CCCCM) was established. "The Organization Regulation of the China Committee for Culture Collections of Microorganisms" and "The Administrative Regulation of the China Culture Collections of Microorganisms" were enacted.

These two documents have been ratified by the National Sciences and Technological Commission of the People's Republic of China. These two regulations are of legislative value and will be enacted in Culture Collections for a long time.

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The organization regulation contains eight articles--name of organization, constitution of the committee, function and task of the committee, organizing system (centers for specialized culture collections), staffs and finance, conference, administrative regulation enactment, ratification and execution of the regulation.

The administrative regulation defines the following items: collection, preservation, nomenclature and catalogue, distribution and exchange, etc.

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TITLE: "Studies on Aphicidin. I. Identification of the Producing Streptomycete"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 113-115

TEXT OF ENGLISH ABSTRACT: In the course of screening for new antibiotic insecticides, a strain of *Streptomyces* 26 was isolated from a soil sample collected from the Tianmu Mountains in Zhejiang Province in 1972. *Streptomyces* strain 26 was found to produce aphicidin, a new insecticide substance. The biological characteristics of this strain were examined, and it was found that the strain was similar to *Streptomyces griseolus* (Waksman, 1923), except for certain physiological and biochemical reactions. It is, therefore, considered to be a new variety of *Streptomyces griseolus* and is designated as *Streptomyces griseolus* var. *hangzhouensis* n. var. Yan et Fang 1978.

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TITLE: "Records on Some Species of Genus *Prathigada* and *Stenella*"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 116-121

TEXT OF ENGLISH ABSTRACT: This report records two spp. of genus *Prathigada* and two spp. of genus *Stenella* in China. Among them, *Prathigada cratavae* (Syd.) Subram. is a new record; *Prathigada picrismae* (Togashi et Katsuki) Liu et Liao, a new combination; and *Stenella caryotae* Liu et Liao, a new species.

Detailed descriptions and figures for each species, as well as Latin diagnosis for the new species, are given in the report. The type specimen is deposited in the herbarium of the Institute of Microbiology, Chinese Academy of Sciences, Beijing.

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TITLE: "A New Species of Erysiphaceae"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 122-123

TEXT OF ENGLISH ABSTRACT: A new species of powdery mildew fungi collected from Yaan, Sichuan, is described, and named *Phyllactinia desmodii* Tao, Qin et Shen sp. nov. The present species is closely related to *Ph. caesalpiniae* (on *Caesalpinia sepiaria* Roxb.), but the size of the perithecium of *Ph. desmodii* was found to be much larger than that of *Ph. caesalpiniae*. Latin and Chinese diagnoses for the new species are given.

Type specimen of the new species is deposited in Sichuan Agricultural College, Yaan, Sichuan, China.

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TITLE: "A New Species of the Genus Phallus"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 124-126

TEXT OF ENGLISH ABSTRACT: A new phalloid fungus is described and denominated *Phallus macrosporus*. It differs from the known species of the genus *Phallus* L. ex Pers. in having larger (6 - 7.6 x 4 - 4.7 μm) spores. Type specimen is deposited in the herbarium of the Department of Biology, Shanxi University, Taiyuan City, Shanxi Province.

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TITLE: "Studies on Cytochrome C of *Ashbya gossypii*--Purification, Crystallization and Comparison of Its Specificity"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 127-133

TEXT OF ENGLISH ABSTRACT: Cytochrome C of *Ashbya gossypii* was isolated from the mycelia by either NaCl extraction or the ethyl acetate autolysis method. It had been purified and crystallized through repeated cation exchange on Zerolit 226 and ammonium sulfate fractionation.

The purified pigment was shown to be homogeneous on starch gel electrophoresis. Both the cytochrome C isolated by NaCl extraction and ethyl acetate autolysis had the same electrophoretic behavior, but the biological activity of cytochrome C isolated by the former method was much higher than that by the latter one.

The absorption spectra of oxidized cytochrome C had peaks at 409, 420-430 nm and the reduced form had the major peaks at 415.5, 521 and 550 nm. The pyridine

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 127-133]

hemochromogen absorption spectra had peaks at 414.5, 520 and 550 nm. The above spectral characteristics of cytochrome demonstrated that the pigment belonged to the C-type of cytochrome.

Crystalline cytochrome C of *A. gossypii* was found to contain 0.438 percent iron. The minimal molecular weight thus calculated was 12,800.

Cytochrome C preparation from six different sources was compared on the basis of its reactivity with cytochrome oxidase and succinoxidase of heart muscle preparation and *A. gossypii* mitochondrial fraction. It was observed that both the cytochrome oxidase of the heart muscle preparation and *A. gossypii* mitochondrial fraction had similar specificities to the six preparations. The relative activities in decreasing order were as follows: *A. gossypii* cytochrome C (NaCl extraction) > *A. gossypii* cytochrome C (ethyl acetate autolysis) > yeast cytochrome C > heart muscle cytochrome C fraction I > heart muscle cytochrome C fraction II > *Pseudomonas fluorescens* cytochrome C-551. The succinoxidase of heart muscle preparation and *A. gossypii* mitochondrial fraction also exhibited similar specificities to the six preparations, but the order of their relative activities was as follows: yeast cytochrome C > *A. gossypii* cytochrome C (NaCl extraction) > *A. gossypii* cytochrome C (ethyl acetate autolysis) > heart muscle cytochrome C fraction I > heart muscle cytochrome C fraction II > *Pseudomonas fluorescens* cytochrome C-551.

Based on these results, the specificity of *A. gossypii* cytochrome C was discussed.

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TITLE: "The Construction and Identification of Clones of Bacteriophage T_4 DNA Ligase Gene (G30) Fragments"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 134-136

TEXT OF ENGLISH ABSTRACT: Over 5,000 clones of bacteriophage T_4 genes were constructed by EcoRI or Hind III partial digestion, then ligation to pBR322 and transformation of *E. coli* KH802. Using the marker rescue test, two clones which contain T_4 G 30 fragments were obtained, one of them (pAM3158) presumably carrying a complete G 30 fragment. It has been shown by agarose gel electrophoresis that the molecular weight of hybrid plasmid (pAM3158) is higher than that of pBR322, and after digestion by Hind III a clear new band appeared.

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TITLE: "Segments Shorter than Virion RNA Produced During In Vitro Transcription of Tobacco Mosaic Virus RNA"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 137-143

TEXT OF ENGLISH ABSTRACT: TMV-specific double-stranded RNAs (RF and RI) synthesized in vivo can be separated into intact TMV-RNA at the selected thermal denaturation conditions of 98°C, 45 seconds, whereas at the same conditions, the viral double-stranded RNAs (showing the same apparent molecular weights as RF and RI) synthesized in vitro can only produce 8 to 10 RNA segments shorter than the virion RNA. The sizes of several of these segments are just like those of the RNAs isolated by Beachy and Zaitlin (1977) from short particles in TMV preparations. The hypothesis that these RNA segments synthesized in partial transcription might be used as TMV-specific mRNAs is discussed.

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ORG: All of the Institute of Microbiology, Chinese Academy of Sciences, Beijing

TITLE: "Some Physical and Chemical Properties of Coliphage C2"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 144-149

TEXT OF ENGLISH ABSTRACT: The RNA phage C2 isolated from sewage in Beijing is identified as a polyhedron about 22 nm in diameter, with a sedimentation coefficient of 79S in SSC buffer and a specific absorbance of 7.8/mg/ml at 260 nm. Base composition analysis of the phage nucleic acid reveals that the molar ratios of adenine, uracil, guanine and cytosine are 22.0, 24.8, 26.1 and 27.0 respectively. The melting temperature of its RNA is 57.5°C, and the molecular weight is 1.1 x 10^6 as determined by polyacrylamide gel electrophoresis. The molecular weights of coat protein and A-protein determined by SDS-polyacrylamide gel electrophoresis are 13,200 and 42,000 respectively.

AUTHOR: ZHANG Qijiu [1728 0366 3773]
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TITLE: "Studies on the Selection and Cultivation of Ribonuclease N_1-High Producing Strain of Neurospora crassa"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 150-156

TEXT OF ENGLISH ABSTRACT: The selection and cultivation of ribonuclease N_1-high producing strain of Neurospora crassa as well as the identification of its ribonuclease is introduced in this paper.

(1) When the initial strain, N. crassa 3.1602 (ornithineless), was treated by 1/5000 triethylene tetramine at 28° for two hours, and followed by treatment with γ-ray irradiation delivered by ^{60}Co at a dose rate of 13.2 Kr for four minutes (total dose, 52.8 Kr), a double auxotrophic strain, ornithineless and adenineless OA047 was derived. N. crassa strain WA011 was obtained from initial strain, 3.1604 (wild-type), by the treatment with 100 μm N-methyl-N'-nitro-N-nitrosoguanidine at 28° for two hours.

(2) N. crassa strain OA047 was grown in shaking flasks containing 5 percent wheat bran at 28-30° for 72 hours, and the activity of ribonuclease in the culture filtrate was 114.5 units/ml. The activity of ribonuclease in the culture filtrate of N. crassa strain WA011 also reached about 100 units/ml after it was grown in

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 150-156]

shaking flasks containing 5 percent soybean powder at 28-30° for 72 hours. The productivity of ribonuclease of both strains, under cultural conditions as described above, was successfully increased 100 times as compared with that of its initial strains growing in modified Frie's medium.
(3) Crude extract of *N. crassa* strain OA047 does not contain enzymic activities of phosphomonoesterase, and phosphodiesterase ribonuclease in crude extract is very stable. After it was heated at 80° for two minutes at pH 1.5-2.0, its activity was almost fully retained. Ribonuclease in the culture filtrate of *N. crassa* OA047 was identified as ribonuclease N_1 by the estimation of 3'-terminal residue of digestion products of yeast RNA, of its hydrolyzation of homopolynucleotides (Poly I, Poly C, Poly A and Poly I: C) and its hydrolase activity for 2', 3'-cyclic guanylic acid.

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TITLE: "Regulation of Glycolysis and Purine Nucleotide Metabolism in the Enzymatic Phosphorylation System of *Mucor aromaticus* Povah"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 157-165

TEXT OF ENGLISH ABSTRACT: We have studied the character of glycolysis, the effects of glucose and phosphate upon glycolysis and regulation of purine nucleotide metabolish of *M. aromaticus*. Although *M. aromaticus* possesses strong fermenting power, the phosphorylation of glucose in *M. aromaticus* is easily effected by the temperature of storage of the mycleia. That may be the key factor affecting glycolysis and phosphorylation of AMP of *M. aromaticus* here.

In the reaction system of enzymatic phosphorylation of *M. aromaticus*, not only the phosphorylation efficiency of AMP but also the accumulation rate of ATP was affected by the concentration of glucose, and the molar ratio of glucose to phosphate (G/P) played an important role in regulating the activation of the enzyme system of glycolysis and purine nucleotide metabolism. The degradation of AMP was inhibited

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 157-165]

as $G/P < 1$. The deamination of AMP brought forth the IMP, and the decomposition of the latter brought forth Ino and/or Hx as $G/P \geqslant 1$. Under certain concentrations of glucose, the high concentration of phosphate could inhibit deamination of AMP and decomposition of IMP, and promote phosphorylation of AMP. It seems that under certain concentrations of phosphate, the inhibition effect of the phosphate on the activity of AMP deaminase and Ino hydrolase can be eliminated when $G/P \geqslant 1$, with AMP deaminated to form IMP, and the latter further decomposed to Hx. Therefore, G/P plays an important regulative role in the metabolic pathway of the purine nucleotide of M. aromaticus.

AUTHOR: LIU Chuiyu [0491 0987 8818]

ORG: Anhui Agricultural College, Hefei

TITLE: "The Parametric Analysis on Microbial Strains"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 166-172

TEXT OF ENGLISH ABSTRACT: The microbiological explanation of the basic parameters for the productive distribution of strains, and the conceptions of the divergent effects and the convergent effects of the mutagens are given in this paper. The following empirical equations: $A = \bar{X}(Ct/6)^{1/5}(1 + Cs/8)^{1/2}$ (called productive capacity) and $B = \bar{X}(6Ct^{-1})^{1/6}(1 + Cs/8)^{1/2}$ (called variate capacity), were obtained from the microbial breeding practice in China. The statistical method used to estimate the productive strains, the mutagens and technology of production are given in this paper.

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TITLE: "Studies on the Application of the Reversed Passive Carbon Agglutination Test to the Detection of Viruliferous Individuals of Rice Dwarf Virus"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 173-179

TEXT OF ENGLISH ABSTRACT: This paper deals with the method of preparation of the rice dwarf virus (RDV) carbon antiserum and its use for detection of viruliferous insects and hosts.

The experimental results indicated that the antiserum must be hydrolyzed into fractions [F(ab$_2$)'] if the preparation of the RDV carbon antibody is made with pure chemical active carbon as carrier. It was better when the F(ab)$_2$' concentration was diluted about 1 mg/ml in 0.1 M phosphate buffer at pH 7.2, and was combined with carbon by grinding at the temperature of 22-30°C for 30 minutes.

This carbon antibody, namely the reversed passive carbon agglutination (RPCA), was

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 173-179]

highly specified and very sensitive. It showed marked agglutination reaction with immune agent of RDV and sap in 1 g of diseased plant and a single viruliferous insect, but it had a negative response to the healthy rice sap rice stripe virus, rice yellow stunt virus and rice yellow dwarf.

It is checked with biological inoculation (BI), and 610 transovarial insects were detected for RDV by RPCA techniques. The average coincidence rate was 83.9 ± 8.5 percent. The RDV positive rate by RPCA techniques was 32.8 percent, whereas by BI techniques it was 31.5 percent. In addition, 1082 field insects were detected, the average coincidence rate being 98.1 ± 0.09 percent. The RDV positive rate by RPCA techniques was 2.22 percent, and the RDV positive rate by BI techniques was 0.56 percent.

The experimental results showed that those by RPCA techniques and BI techniques were close, and therefore the RPCA techniques would be useful practically in production.

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TITLE: "A Survey of Hydrogen Evolution from Leguminous Root Nodules"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 180-184

TEXT OF ENGLISH ABSTRACT: A survey of H_2-evolution of nodulated root systems of broad beans, peas, vetch, astragalus, hairy vetch, soybeans and peanuts grown in field conditions was carried out. It showed that all samples analyzed released H_2 to different extents. The mean relative efficiency of energy utilization for nitrogen fixation was 0.754, or approximately 25 percent of the energy was wasted in H_2-evolution.

Among nearly 200 strains of rhizobia tested, several non-H_2-releasing strains (i.e., the relative efficiency $\geq$ 0.95) were found, among them being soybean rhizobial strains 182-2 and 113-2 and peanut strain 97-1. None of the astragalus

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 180-184]

rhizobial strains tested were non-H_2-releasing strains.

A comparison between non-H_2-releasing strains and H_2-releasing strains, and statistical analysis of three sets of experimental data (including a set of Schubert and Evans data) have shown that dry matter accumulation of soybean-rhizobia symbiotic system is highly correlated with nitrogenase activity, while the effect of H_2-evolution on dry matter accumulation is of minor importance.

AUTHOR: FA Youhua [3127 1635 5478]
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TITLE: "The Microbial Dehydrogenation of Ring-A Saturated Steroids. I. Preparation of Dehydro-17 -Methyl-Testosterone from 17 -Methyl-Androstane-3 , 17 -Diol"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 185-190

TEXT OF ENGLISH ABSTRACT: In this study, the dehydrogenation abilities of 62 strains of microorganisms (belonging to the genera Nocardia and Arthrobacter) on 17α-methyl-5α-androstane-3β, 17β-diol (I) and 17α-methyl-testosterone (III) were compared. Results showed that on the basis of the characteristics of dehydrogenation in these microorganisms, four patterns of microbial transformation were identified:
(1) $I \nrightarrow III \nrightarrow IV$
(2) $I \rightarrow III \rightarrow IV$
(3) $I \rightarrow III \nrightarrow IV$
(4) $I \nrightarrow III \rightarrow IV$.

An Arthrobacter 9-2 strain which can oxidize (I) completely was selected from the

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 185-190]

second pattern of microbial transformation. Addition of $CoSO_4$ in its cultural medium inhibited the degradation of dehydro-17α-methyl-testosterone (IV), so that the product accumulated greatly.

The optimal pH of dehydrogenation was about 6, and the optimal concentration of ethanol used to dissolve the substrate was 2 percent. Under these conditions, the transformation rate of the dehydro-17α-methyl-testosterone (IV) was over 85 percent.

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TITLE: "Purification and Identification of Jingsimycin"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 191-195

TEXT OF ENGLISH ABSTRACT: *Streptomyces hygroscopicus* var. *jinggansis* Yan is closely related to *Streptomyces hygroscopicus* var. *limonsus*. In addition to jinggangmycin, it produces an antifungal antibiotic Jingsimycin which was proved to be similar to Saramycetin both in physiochemical and biological properties. The hydrolysate gave eight spots on paper chromatography. Five of them were identified as cysteine, aspartic acid, glycine, threonine and proline.

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TITLE: "Cytopathic Effect of Tick-Borne Encephalitis Virus in Chick Embryo Cells and Its Application"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 196-202

TEXT OF ENGLISH ABSTRACT: Some strains of tick-borne encephalitis virus exerted a marked cytopathogenic effect on fibroblast cell cultures prepared from the skin-muscle tissue of chick embryo. The specificity of the CPE was confirmed by the neutralization test with homologous immune serum. The CPE of the virus and its propagation were evident in each passage.

The cytopathogenic titers in monolayer cell cultures varied from 7.0 to 9.0 log $TCID_{50}$, corresponding approximately to the virus titer estimated in mice.

A simple and sensitive neutralization test for tick-borne encephalitis virus in chick embryo monolayer cell cultures was elaborated. Based on these results this

[Continuation of WEISHENGWU XUEBAO Vol 20 No 2, 1980 pp 196-202]

method might be applied in the diagnosis and serological survey of tick-borne encephalitis.

The role of the above-mentioned factors which influenced the cytopathogenicity of the tick-borne encephalitis virus was discussed.

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TITLE: "Studies on the Vaccination of Rhesus Monkeys against Plasmodium knowlesi Malaria by the Use of Non-Soluble Antigen Fractions"

SOURCE: Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 20 No 2, 1980 pp 203-207

TEXT OF ENGLISH ABSTRACT: This is a report of a successful immunization of monkeys against Plasmodium knowlesi malaria by the use of insoluble antigen fraction without adjuvant.

1. The antigens are prepared according to a previous paper (Li et al., 1974). Parasites are harvested from infected monkeys' blood at peak parasitemia with mature schizont using a 1% saponin solution in 0.9% saline. The pooled parasites are suspended in four volumes of 5mM $MgCl_2$ solution, and homogenized with a universal homogenizer at 10,000 rpm for 15 minutes. The resulting suspension was centrifuged to fractionate various antigen components. The pellet, sedimented with centrifugation at 10,000 g for 30 minutes, is designated as antigen fraction II. The supernatant was recentrifuged at 105,000 g for 60 minutes, the resulting pellet

being designated as antigen fraction I.

2. All antigen fractions are diluted with a volume of 0.9% saline and no adjuvants are added. The suspensions of these two fractions are used directly in vaccination.

3. Fifteen monkeys (Macdoca mulatta) used in this experiment were divided into groups I, II and III (control), having five monkeys each. 2-3 ml of vaccine antigens were injected intramuscularly three times to each animal of the two immunized groups, group I with fraction I and group II with fraction II. Ten days later all experimental monkeys were challenged with intravenous inoculation of 11 x 10^3 erythrocytes infected with homologous parasites.

4. In group I, four of the five monkeys survived and three of the surviving animals did not develop parasitemia, showing the greatest protection. The protection of antigen fraction II was poor, with only one of the five vaccinated monkeys surviving while the others developed high-grade parasitemia and finally died. All five control monkeys developed lethal infections.

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NATIONAL DEVELOPMENTS

BRIEFS

NATIONAL ACADEMIC SYMPOSIUM--The national symposium on optics, laser and frontier branches of learning was held in Wuxi from 22 to 24 November. It was attended by over 50 scientists and technicians engaged in the study of laser, physics, chemistry, biology, medicines, agriculture and environmental protection in 13 provinces, municipalities and autonomous regions throughout the country. A total of 32 academic papers were read at the seminar, including 2 papers on anticarcinoma substances derived from combined reactions of ultrasonic laser and anticarcinoma medicinal herbs and the therapeutic effects of a brand new anticarcinoma drug. [Shanghai City Service in Mandarin 1130 GMT 25 Nov 80 OW]

COMPUTING MECHANICS SYMPOSIUM--Hangzhou, 24 Nov (XINHUA)--The 1980 national symposium on computing mechanics sponsored by the China Mechanics Society was held in Hangzhou, Zhejiang, in mid-November. Some 299 representatives from all ministries and commissions under the State Council, the Chinese Academy of Sciences, colleges, universities and scientific research institutes delivered 385 theses at the symposium. Qian Lingxi, vice president of the China Mechanics Society, spoke, noting that study on the theory and application of computing mechanics in China has been broadened in recent years and that China is catching up with the international level in this field. Chinese mechanics expert Qian Weichang, deputy director He Guangqian of the building research institute and pneumatic mechanics expert Zhuang Fenggan, as well as American professor Ka-de-si-dun-sai, gave lectures at the symposium. [Beijing XINHUA Domestic Service in Chinese 0133 GMT 24 Nov 80]

SYSTEMS ENGINEERING SOCIETY--The Chinese Society of System Engineering was recently founded in Beijing at a meeting. Systems engineering is a new branch of learning. In recent years China has achieved gratifying success in applying systems engineering in coordinating and balancing engineering projects, instituting comprehensive quality control processes in industrial enterprises, mapping out plans for population control and in military equipment programming. The establishment of such a modern scientific and technological department as systems engineering will have great effects in understanding and transforming the objective world. The meeting elected Qian Xuesen and Xue Muqiao as the society's honorary presidents, and elected Guan Zhaozhi as its president. [Text] [OW271205 Beijing Domestic Service in Mandarin 1000 GMT 25 Nov 80 OW]

CSO: 4008

APPLIED SCIENCES

CAUSES OF WASTE, INFERIOR PRODUCTS STUDIED

Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 4 Aug 80 pp 13-14

[Article by Ling Wenquan [0407 2429 6530] of the Psychology Institute of the Chinese Academy of Sciences]

[Text] Developing quality control is first to seek out the causes that affect quality--i.e., the things that produce waste and inferior products--and then to solve the problem directly. Ordinarily in quality control in industrial and mining enterprises, analysis of problems of the quality of products mostly utilizes the method of mathematical statistics to seek out the causes in materials, machinery and technological and operational methods. Therefore analysis of the human factor is often neglected. Actually, the human being is a very important factor that affects quality. Analysis of the quality of products based on the human factor requires "efficiency theory."

The following talks about "efficiency theory" and the problem of quality analysis.

1. Statistical Analysis

Statistical analysis in the theory of efficiency is generally an analysis of the causes that create waste and inferior products from the point of view of time, location, position, work type, procedure, worker's age and sex.

(1) Time Analysis--the human being is a living entity. Some physiological phenomena of the human body frequently undergo periodic changes over a period of time. These biological regulatory patterns affect the human being's physiological activity and psychological activity. They are further reflected in the quality of products. Therefore, conducting statistical analysis and comparing the quality of products produced by different shifts (day shift, swing shift, night shift) in different months and different seasons are one aspect of searching for the causes of waste and inferior products.

(2) Analysis by Location--Taking the statistical analysis of the occurrence of spots on fur materials as an example, one textile plant compiled the following statistics for October 1979: Spots found on the material 5 meters from the head of the machine constituted 38 percent, spots 5 to 10 meters from the head of the machine constituted 11 percent, and spots 5 meters from the tail end of the machine constituted 10 percent. Spots on the material spanning 5 meters at the

center constituted only 4.5 percent. Thus, it can be seen, statistical analysis according to location is also one clue to searching for waste and substandard products.

(3) Analysis by work procedure—Often a product has to go through many procedures of processing or treatment. Each procedure may cause waste or inferior products. But which procedure is the main one: This requires statistical analysis by procedure. After analysis, the main procedure that affects product quality is treated. In this way, the factors affecting quality can be eliminated during the production process.

2. Classification of the Causes of Waste and Inferior Products

There are many causes that create waste and inferior products. They can be classified into the following two main types: human causes and objective causes. Human causes also include physiological and pshchological causes. Objective causes include material conditions, social problems, organization and management, technical design, and each aspect can be further divided into many causes (see Figure 1).

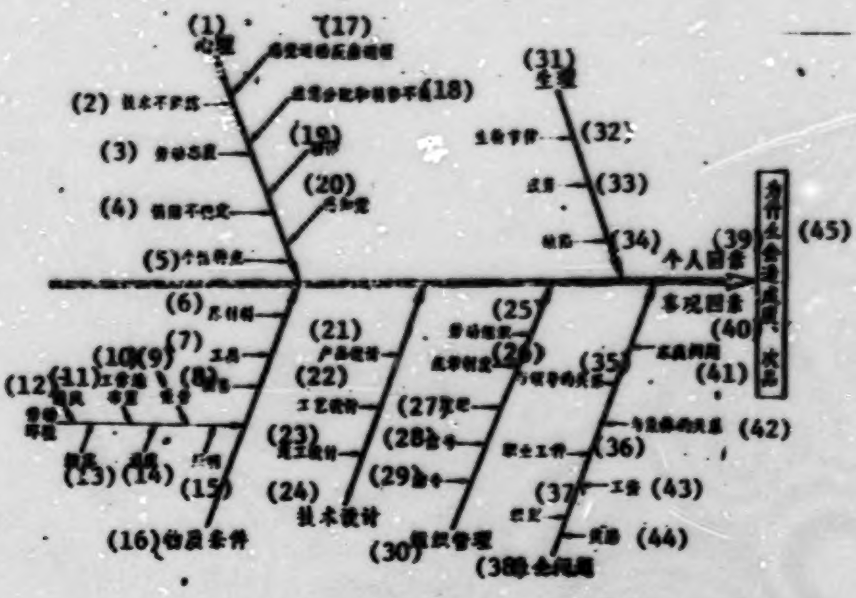

Figure 1. Illustration of the important causes that create waste and substandard products

Key:
(1) Psychological state
(2) Technically unskilled
(3) Work attitude
(4) Emotionally unstable
(5) Characteristics of personality
(6) Raw material
(7) Tools
(8) Equipment
(9) Noise
(10) Plan of the place of work
(11) Ventilation
(12) Work environment

[key continued next page]

[Key to Figure 1--continued]

(13) Smoke
(14) Temperature
(15) Lighting
(16) Material conditions
(17) Slow sensory and motor reactions
(18) Distracted attention and poor shifting of attention
(19) Movement
(20) Senses
(21) Product design
(22) Technological design
(23) Construction design
(24) Technical design
(25) Labor organization
(26) Regulations and system
(27) Quotas
(28) Signals
(29) Commands
(30) Organization and management
(31) Physiological state
(32) Biological patterns
(33) Fatigue
(34) Shortcomings
(35) Relationship with the leadership
(36) Vocation and type of work
(37) Class and rank
(38) Social problems
(39) Individual factor
(40) Objective factor
(41) Family problems
(42) Relationship with the collective
(43) Wages
(44) Rewards
(45) Reasons why waste and substandard products are created

It can be seen from Figure 1 that the factors affecting product quality are complex and mutually related. In particular, many material conditions, technical design, organization and management, social problems are all closely related to the human factor, and mutually affect each other. For example, improper lighting will affect vision, the ability of recognition and operation, further affecting the quality of products. Similarly, working in a very noisy environment or a high temperature environment will easily result in fatigue, emotional discomfort, loss of concentration, slowed reaction, low efficiency and poor quality. In addition, problems of organization and in management of enterprises, family, marriage, relationship with the leadership, wages and benefits and such social problems also directly affect the emotion and the work attitude of the workers, and further affect the quality of the products. It can thus be seen that the human factor is an important one in the various factors affecting production quality (see Table). Efficiency theory is to analyze the causes that produce waste and inferior products from the human factor point of view, and to seek a method of solution.

Analysis of the Causes of Waste Products at a Certain Plant

Causes of Waste Products	Percentage of the total
Workers mistake	49.02
Inconsistency of manufactured product and defuctive fur material	31.05
Mistaken guidance	8.33
Mistaken supervision	0.82
Poor tools	0.38
Poor management and incomplete facilities	0.20
Others	10.20

3. Psychological Analysis of the Production of Waste and Inferior Products

Any type of productive activity is a complex psychological activity. When a certain course of psychological activity is affected, motor activity will be affected, and thus affecting the quality of the product. For example, difficulty with the senses is a frequently seen cause that produces waste and inferior products, mainly caused by mistaken vision. For example, a mistaken recognition of shapes will cause mistakes in processing of products. Inaccurate judgment of the distance of sawing by a shop worker and shutting off the lathe late will cause jamming of the saws. Also, in grinding operations, the correct observation of the time of contact of a piece of work with the grinding wheel is also greatly related to the quality of the products. If the contact time of the piece of work with the grinding wheel is too short, the specifications of the common error margin will not be reached. Conversely, when the time of contact is too long, a wasted piece of work will be produced. In addition, fatigue is also often a factor affecting production. Fatigue can be classified into three types, physiological fatigue, objective fatigue and subjective fatigue. This is because fatigue can cause incoordination of motor skills, inaccuracy, distraction of attention and shifting of attention which in turn causes lateness, slowed reaction, reduction of vision and thus further affecting senses and operation of the subject, producing waste and inferior products and reducing production efficiency.

The above is a simple analysis of the factors that affect product quality from the point of view of efficiency theory. The scope of study of efficiency theory is actually very broad. It emphasizes the study of the relationship among man, machines and work environment to increase production efficiency and product quality and assure production safety and health of the workers. Therefore, with the help of the study and application of efficiency theory and psychology in quality control in enterprises, the overall work in quality control in enterprises can be done better.

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Chemistry

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ORG: WU and XU both of the Department of Chemistry; GAO, CHEN, WANG and JIANG all of the Department of Technical Physics

TITLE: "On the Association of PZL with Some Neutral Organophosphoric Acid Esters in Various Organic Solvents"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1980 pp 22-29

TEXT OF ENGLISH ABSTRACT: 1-phenyl-3-methyl-4-benzoyl-pyrazolone-5 (PZL) is an important chelating extractant. Many papers have been published on the extraction of more than 50 metal ions with PZL either alone or in the presence of some neutral organophosphoric acid esters. In order to elucidate the mechanism of such synergistic extractions, we have determined the association constants of PZL with TBP, DBBP, BDBP, TOPO in various organic solvents by IR, UV spectrophotometry and the solubility method. The results are summarized in the following table.

[Continuation of BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 22-29]

Association Constants K of PZL and B

$$K = [PZL \cdot B]/[PZL]\,[B]$$

B	Solvents	Method	K
BDBP	n-hexane	IR	1.8
	C_6H_6	IR	2.1
	Cyclohexane	IR	2.1
	CCl_4	IR	1.7
DBBP	n-hexane	IR	1.0
TBP	TBP	IR	0.3
TOPO	C_6H_6	IR	7.5
	Cyclohexane	IR	7.9
	n-hexane	IR	6.7
	n-hexane	UV	7.3
	CCl_4	IR	5.0
	CCl_4	Solubility	5.6

The association constants K decrease with the decreasing electronegativity of the O atom of the $-\overset{|}{\underset{|}{P}} = O$ bond, namely, TOPO > BDBP > DBBP > TBP.

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ORG: All of the Department of Chemistry

TITLE: "Studies of the Organophosphorus Pollutants in Well Water Near a Dimethoate Plant. II. Gas Chromatographic Method for the Determination of O, O, S-Trimethyldithiophosphate and O, O, O-Trimethylthiophosphate"

SOURCE: Beijing BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1980 pp 75-83

TEXT OF ENGLISH ABSTRACT: Based on previous studies, a GC method for the determination of the main pollutants, i.e., O, O, S-trimethyldithiophosphate and O, O, O-trimethylthiophosphate, has been worked out with preliminary solvent extraction of well water samples with either benzene or chloroform, followed by the concentration of the extract in a Kuderna-Danish evaporator under partial vacuum. The GC determination of the two pollutants was carried out on either one of the following two columns: 3% DEGA/Shanghai Chemical Company 101 AW DMCS, 60-80 mesh, 1 m x 2.5 mm and 5% PEG 20M/Celite 545 AW DMCS, 60-80 mesh, 1 m x 3 mm. A flame photometric detector with a 525 nm P-filter was used. The recovery rate of solvent extraction

[Continuation of BEIJING DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 75-83]

with benzene or chloroform and the concentration recovery rate in the Kuderna-Danish evaporator were also determined at several fortification levels. If a well water sample of 3 L was taken and extracted with 30 ml benzene, and one-half of it was reduced to a volume of 0.5 ml, then the lower limit of determination reached 0.07 ppb when 1/μl of the concentrated extract was injected. The total recoveries of O, O, S-trimethyldithiophosphate and O, O, O-trimethylthiophosphate were 97 percent and 78 percent respectively. The method recommended was quite sensitive and easily reproducible.

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AUTHOR: LI Rongsheng [2621 2837 3932]

ORG: None

TITLE: "On China's Inland Fish Resources and the Problem of Their Utilization"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 10, Oct 80 pp 1-3

ABSTRACT: China's inland streams and natural lakes are extremely numerous. Areas of fresh water lakes measure 36,000 km^2 with additional 80,000 reservoirs of all sizes. All of these may be used to raise domesticated fishes. Fish culture of the 6 regions of the Yangzi and Huaihe valleys, the South China mountainous regions, the Huanghe and Haihe valleys, the Heilongjiang and Liaohe valleys, the Nei Monggol and Xinjiang regions, and the Qinghai and Xizang plateau regions is briefly reviewed. Problems in developing China's inland fishery discussed in the paper include the emphasis on grain production causing reduction of areas of natural lakes, damages to the inland water environment, and slow progress of fish culture. At present, only about one third of the water areas is used to raise fish. Judging from the current condition, the most promising areas for developing fish culture are in the suburbs. The establishment of commercial fish bases to supply live fresh water fishes to the cities and the industrial and mining centers is proposed.

AUTHOR: LU Yunting [4151 0061 0080]

ORG: None

TITLE: "Is Luobubo [Lop Nor] a Wandering Lake?"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 10, Oct 80 pp 10-11

ABSTRACT: Affected by the neotectonic movement within the lake basin and the changing volume of water entering the lake, historically, the size of Luobubo often appears to be changing. This type of change is in fact a process of natural historical evolution, but it has often been mistaken to be the phenomenon of a wandering lake, moving sometimes to the east, sometimes to the west, and sometimes to its original position. The author reviews historical records, survey data, and satellite information to explain the fact that due to tectonic, paleo-hydrographic, and social factors, the area of the water surface of Luobubo undergoes a process of expansion and contraction. The conclusion of its being a wandering lake by 2 Russian scientists does not coincide with the facts.

AUTHOR: CHEN Yuanmou [7115 6678 6180]

ORG: None

TITLE: "Jingtong Railway"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 10, Oct 80 p 11

ABSTRACT: The Jingtong Railway starts from the Beijing suburb of Changping, passing through Luanping, Weichang of Hebei Province, Chifeng of Zhaomuda League to reach Tongliao of Zhelimu League, both of Nei Monggol. The line measures a total of 806 km. It joins the Beijing-Baotou Line at its starting point and will be linked with Tongliao-Huohelin Mining District Line which is under construction. In order to complete the Jingtong Line, 106 tunnels, measuring a total of 73 km and 409 bridges, measuring a total of 42 km had to be constructed. In order to allow the railway to pass through a desert region, various measures were taken to stabilize the sand and to protect the roadway from the wind. In 5 short years, on both sides of a 100 km section, more than 7 million trees were planted to grow a forest covering more than 8600 mu. These trees have effectively held the sand dunes and kept the railway safe. A map depicting the length of the railroad is included.

AUTHOR: XU Maoqi [1776 5399 0366]

ORG: None

TITLE: "A Group of Mud Volcanoes in Qujiang of Sichuan Province"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 10, Oct 80 p 14

ABSTRACT: The mud volcanoes described in the paper are distributed on the low banks of Qujiang, which is a branch of Jialingjiang. Their eruption activities are similar to ordinary volcanoes but much weaker and more importantly they do not spurt out lava. The materials gushing out of them are steam, gas, mud, etc.; they are also known as pseudo-volcanoes. Aside from describing mud volcanoes and their genesis, the paper also mentions the fact that oil and gas exploration of recent years has reduced the gaseous pressure of the region and the gushing is becoming increasingly weaker.

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CSO: 4009

AUTHOR: CHEN Zhixuan [7115 1807 6513]
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ORG: None

TITLE: "Prevention and Treatment of Metabolic Acidosis During and After Direct Vision Intracardiac Surgery Under Extracorporeal Circulation: (I) Analysis of the Amount of Sodium Bicarbonate Used During and After Direct Vision Intracardiac Surgery"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 5, Oct 80 pp 260-263

ABSTRACT: This paper analyses the amount of alkaline solution used and the various factors affecting the needed quantity in the 64 cases of open heart surgery performed at the unnamed hospital to which the authors were affiliated in 1975-78 for the purpose of fixing a definite principle so as to provide reference data for the prevention and treatment of metabolic acidosis. Congenital heart diseases were involved in all 64 patients. In order to maintain urine pH at 7½, a suitable amount of sodium carbonate was given when pH fell below 6.5. The body temperature was reduced to 28-32°C for Group A of 28 cases and 20-28°C for Group B of 36 cases. Data of the 2 groups are analysed and compared. There was no death in the 64 cases.

AUTHOR: LIU Shiheng [0491 0013 1854]
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ORG: None

TITLE: "Contraindications of Early Excision in Extensive Burn Crust"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 5, Oct 80 pp 264-266

ABSTRACT: Bacteria may exist in the hair follicles even under III degree burn crust and will rapidly multiply 5 days after the burn to cause serious infection; therefore, early excision of the crust is an effective measure for removing the major source of infection to create a favorable condition for early healing. In the past decade the authors treated 63 cases of severe burns and 77 early excision operations were performed. Of these, 5 patients died within 3 days of the surgery, serious complications occurred to 7 patients, and massive hemorrhage occurred during the surgery to one. This paper analyzes the clinical data of these 13 cases and discusses the conditions under which early excision of burn crust appears to be not advisable.

AUTHOR: CHEN Mingjiu [7115 7686 0046]
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ORG: None

TITLE: "Reserved Replantation of Free Mandibular Bone Fragment From Firearms Injury"

SOURCE: Beijing JIEFANGJUN YIXUE ZAZHI [LIBERATION ARMY MEDICAL JOURNAL] in Chinese No 5, Oct 80 pp 267-268

ABSTRACT: In treatment of firearm injury of mandible, it is generally agreed here and abroad that fragments joined with the periosteum should be retained for future replantation. With respect to free fragments, most Chinese surgeons believed in the past that they should be discarded. Most recently, Morgan. H.H. (ORAL SURGERY 26:727, 1968) successfully retransplanted free fragments after proper treatment. In 1975-79, the authors adopted Morgan's technique and replanted the free gragments in 3 cases of firearm injuries causing gaps of 3.5-5.0 cm of the mandibular bone. Case histories of the 3 patients are reported and discussed.

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ORG: None

TITLE: "Experimental Therapy of Severe Frostbite by Repeated Immersions in Warm Chlorhexidine Solution"

ABSTRACT: At present the consensus is that fast thawing with warm water is the best method of emergency rescue for severe frostbite but it is effective only when it is applied under the frozen state and is not effective after the frostbittten limbs have already thawed out. For the purpose of searching for a method of treating thawed out frostbites, the authors induced frostbites in rabbits and divided them into various groups for treatment with warm water (40°C) and warm chlorhexidine (40°C) in various procedures for comparison. Repeated immersions in warm chlorhexidine were found to produce obvious healing effect, repeated immersions in either warm water alone or in cold chlorhexidine were found to produce no effect. Repeated immersions of thawed out frostbitten rabbit limbs in warm water were found to accelerate development of tissue gangrene and should definitely not be used as a treatment.

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CSO: 4009

AUTHOR: WU Enlin [0702 1869 2651]

ORG: Zhejiang University

TITLE: "Heat Treatment in Nitrogen Controlled Atmosphere"

SOURCE: Beijing JINSHU RECHULI [HEAT TREATMENT OF METALS] in Chinese No 1, 25 Jan 80 pp 8-14

ABSTRACT: Using nitrogen as a form of neutral atmosphere in heat treatment has had a history of many years but using nitrogen as one of the major components of the controlled atmosphere is a new technique developed in foreign countries only in recent years. Pure nitrogen (above 99.99 percent nitrogen content) or industrial nitrogen (having 2-5 percent of oxygen content) is used as the basic gaseous raw material. Based upon various methods of preparation and usage, a suitable amount of hydrocarbon is added along with certain reaction participating gases such as H_2, NH_3, CO_2 etc. to form the controlled atmosphere with nitrogen as the major element for various heat treatment of metals such as polishing, chemical heat treatment, the sintering process in powder metallurgy, drilling, soldering, etc. This paper reports 2 ways of preparing the nitrogen atmosphere, its applications, and its economical benefits.

AUTHOR: LAN Tianpei [5663 1131 1014]

ORG: Chongqing Sewing Machine Plant

TITLE: "Application of Nontoxic Liquid Carburization"

SOURCE: Beijing JINSHU RECHULI [HEAT TREATMENT OF METALS] in Chinese No 1, 25 Jan 80 pp 41-42

ABSTRACT: The threading hole of the sewing machine made in Chongqing Sewing Machine Plant requires 0.40-0.50 mm of carburization and after quenching, the hardness should reach HRC50-63. Originally, sodium cyanide was used for liquid carburising. In order to avoid using this toxic pollutant, Silicon carbide was first used to replace sodium cyanide, with some Na_2CO_3 and NaCl added. Later, due to the high cost of silicon carbide, emery was used in its place. This paper describes the various experiments and the final success of preparing a mixture for nontoxic liquid carburization and discusses the key problems to be overcome in order to produce normal reactions.

AUTHOR: ZHANG Xuefa [1728 1331 4099]

ORG: Dalian Oil Pump Plant

TITLE: "Electric Furnace Silicon Controlled Trigger-free Switch"

SOURCE: Beijing JINSHU RECHULI [HEAT TREATMENT OF METALS] in Chinese No 1, 25 Jan 80 pp 42-44

ABSTRACT: In the past, the heat treatment machine shop of the plant used AC trigger to control the temperature of its electric furnaces, and problems of burned out triggers, damaged coils, and adhesion occurred constantly. In 1975, silicon controlled AC trigger-free switch was adopted to replace the old ones. In 4 years of use, the silicon controlled switches have been proved to be reliable, safe, and fast, and to consume less electricity. The work theory of silicon controlled switches, the protective system for this equipment, and the method of making the electronic relay are described.

AUTHOR: YAN Xiaosheng [7051 0876 3932]

ORG: Shenyang Tractor Manufacturing Plant

TITLE: "Discussion of Several Problems Concerning the Heat Absorption Type Generators"

SOURCE: Beijing JINSHU RECHULI [HEAT TREATMENT OF METALS] in Chinese No 1, 25 Jan 80 pp 44-51

ABSTRACT: The heat absorption type generator is an equipment for generating controlled atmosphere. The stability of its gas producing process is a very important problem. In view of China's current resources condition, using raw material gas of high alkene content is another important problem. This paper analyzes the release-absorption process of this type of generator. A preliminary investigation of the causes of appearance of carbon black in the operating process of the generator brings about the conclusion that carbon black appears at the base of the generator mainly during the reaction process of cracking, burning, and heat releasing of the raw material gas between 500-800°C. Based upon this understanding, some reforms are introduced to reduce the energy consumption and to provide more favorable conditions of temperature and time for the heat absorbing reaction.

6168
CSO: 4009

Metallurgy

AUTHOR: CHENG Lanbo [2052 5695 0130]

ORG: Research Institute of Anshan Iron and Steel Company

TITLE: "On the Rational Distribution of Gas Flow for the Blast Furnace"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 1-7

TEXT OF ENGLISH ABSTRACT: Based on long-term practice and a series of experiments of the blast furnaces in Anshan Iron and Steel Company, the author of this paper puts forward a viewpoint that the rational distribution of gas flow in the blast furnace is the decisive factor affecting the heat transfer, mass transfer and momentum transfer, as well as the intensification of the smelting process. This effect would naturally intensify the furnace operation and better economize iron production. The proper distribution of gas flow should be uniform and evenly distributed. Therefore the double peak curve showing the CO_2 percentage of throat gas should be as flat as possible in order to get the best utilization of the gas energy. The rational distribution of the gas flow in the blast furnace could be achieved mainly by the adjustment of the air blast in the lower part, accompanied by correct burden distribution in the upper part. At the same time, the hearth should be kept in good working condition. According to the facts described above, the general rules of the adjustment in the upper and lower parts of the furnace are summarized.

AUTHOR: GAO Runzhi [7559 3387 5347]

ORG: Capital Iron and Steel Company

TITLE: "The Blast Furnace Operating Experiences of Capital Iron and Steel Company"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 8-13

TEXT OF ENGLISH ABSTRACT: This paper summarizes the principles and experiences of blast furnace operation of Capital Iron and Steel Company. For years a higher and steady production of good quality pig iron with low fuel consumption has been maintained. Their chief experiences include: paying close attention to the control of raw materials; keeping a fixed full blast volume; adopting a high top pressure and an oxygen enriched high temperature blast together with coal injection; using greater ore batch weight with "O↓C↓" type charging sequence. They are mainly making basic iron of low Si and low S content, operating with a fixed blast volume, high blast temperature and fixed weight of ore batch in the furnace burden.

AUTHOR: GUO Shangfen [6753 1424 1164]
HE Yuxin [6320 3022 6580]

ORG: GUO of Tianjin Metallurgical Material Research Institute; HE of Beijing Institute of Iron and Steel Technology

TITLE: "An Analysis of Mathematic Model and Related Formulas for the Rolling Force"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 14-21

TEXT OF ENGLISH ABSTRACT: The general problems regarding the rolling force formulas for cold strip rolling are analyzed.

In the derivation of Chen Jiamin's [7115 1367 3046] rolling force formula, the shear stress from friction is retained in its plasticity equation. This makes the results of calculation approach the real value. Based on this formula we have established a model for the rolling force.

The factors in eight rolling force formulas have been unified into $\mu l/\bar{h}$ and ε, so that they all have a similar functional expression $n = \varphi(\mu l/\bar{h}, \varepsilon)$, with the following advantages:
1) The number of factors in the rolling force formula is decreased and the program of calculation and in-line control shortened.

[Continuation of GANGTIE No 7, Oct 80 pp 14-21]

2) The formulas can be quantitatively compared, and it is convenient to evaluate and choose among them.
3) Four of the formulas were converted into linear equations and the other four remain non-linear. For the non-linear formulas, simpler expressions may be used to substitute for the complicated ones.

AUTHOR: LI Lianshi [2621 6647 6108]

ORG: Beijing Institute of Iron and Steel Technology

TITLE: "Theoretical Analysis of a New 2-Skew-Roll Tube Elongator"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 22-28

TEXT OF ENGLISH ABSTRACT: This paper presents a skew-roll tube elongator with side guides, semi-retained mandrel and two rolls having a "double reduction" pass design. Based on results of experiments and production practice, this elongator has proved to be superior to Assel, Transval and Diesher mill throughout, in quality of products and material consumption.

The paper also discusses the technological basis of the machine, including flow and deformation of the metal, the problem of slip, rolling force and torque, and conditions affecting roll-bite.

AUTHOR: ZHANG Shanyuan [1728 0810 0337]
JIN Yukang [7246 5940 1660]
Hideaki MATSUBARA
Hisashi SUZUKI

ORG: ZHANG and JIN both of the Central Iron and Steel Research Institute, Beijing; MATSUBARA and SUZUKI both of the University of Tokyo

TITLE: "Bending Load-Deflection Curves in WC-Co Cemented Carbide"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 29-36

TEXT OF ENGLISH ABSTRACT: The deformation characteristics of WC-(10∼30)%Co cemented carbide were studied in the temperature range from room temperature to 1000°C by means of the three-point bend test as a function of cobalt contents, carbide grain size and domain size of binder.

It was found that, in the alloy with a fixed cobalt content, the deformation became suppressed above about 800°C with increasing carbide grain size, and above about 600°C with increasing domain size of binder, effects of the two factors being converse to those observed at lower temperatures. It was also found that at a fixed temperature the transverse-rupture strength of the alloy generally increased with the steepness of load-deflection curves.

AUTHOR: LIU Jinrong [0719 6855 2873]
MA Huijun [7456 1920 0689]
REN Dongwei [0117 2639 0251]
HU Keren [5170 0668 0086]
CI Yunxiang [1964 0061 4382]

ORG: LIU, MA, REN and HU all of Beijing Rare Earth Research Institute; CI of the Department of Chemistry, Beijing University

TITLE: "Spectrophotometric Determination of Total Rare Earth Content and Yttrium Subgroup in Microamounts"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 37-40

TEXT OF ENGLISH ABSTRACT: A spectrophotometric method for the determination of total rare earths (RE) and yttrium subgroup in microamounts is proposed, using chromazurols, 1.10-phenanthroline and cetyltrimethylammonium bromide. The total RE is determined in a solution with pH 9.5. The limit of detection is 0.008 μg/ml. Interference from various ions is reported. The interference of Fe^{3+} and Al^{3+} is eliminated with hydroxylamine and sulfosalicylate respectively. The yttrium subgroup was determined in a solution with pH 8.4. The interference of cerium group elements is eliminated by an addition of sodium bicarbonate. The method is accurate enough for practical purposes.

AUTHOR: YANG Dong [2799 2767]
LU Shanghan [5684 1424 3352]
ZHI Shui [4249 3055]

ORG: YANG and LU both of the Iron and Steel Department, Ministry of Metallurgical Industry; ZHI of the Central Iron and Steel Research Institute, Ministry of Metallurgical Industry

TITLE: "Development of Powder Injection Technique in Our Country"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 51-55

TEXT OF ENGLISH ABSTRACT: A technical demonstration of powder injection apparatus and operation was held in Beijing in April 1980. Three main types of injection systems, namely, the partly fluidized unit with bottom discharge, the partly fluidized unit with top discharge, and the unit with partly loosened material and bottom discharge, as well as the results of using these units, are described. The selection of injection vessel and technology, problems in injection metallurgy engineering, powders of new types, refractory and mechanism of injection metallurgy are discussed in connection with actual practice in China.

AUTHOR: ZHI Shui [4249 3055]
ZHANG Bingying [1728 4426 5391]
LOU Shenghe [2869 4141 6378]

ORG: All of the Central Iron and Steel Research Institute, Ministry of Metallurgical Industry

TITLE: "Injection Metallurgy Abroad--Technique of Powder Injection in Ladle"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 7, Oct 80 pp 56-65

TEXT OF ENGLISH ABSTRACT: Powder injection in ladle is a new technology developed during the 70's. Up to now more than 40 units have been used in industry around the world. The main types of equipment are TN (Thyssen Niederrhein) system and SL (Scandinavian Lancers) system. The powders used are: Ca-Si, CaC_2, Mg + CaO, $Ca(CN)_2$, CaO, etc. For the TN process ladles are lined with dolomite, and for the SL process both fire clay and magnesia brick are suitable. Usually argon is used as the carrier gas.

As a result of powder injection, some detrimental elements in steel can be substantially lowered, such as, S to 0.002~0.005%, P to 0.005%, O to 0.0015%. MnS inclusions can be eliminated and undeformable inclusions of the spinel ($CaO \cdot Al_2O_3$) type formed. Ultra low sulfur steel, low phosphoric steels and heavy plates with superior toughness in Z direction can thus be produced. The powder injection

[Continuation of GANGTIE No 7, Oct 80 pp 56-65]

technique has the advantages of simple equipment, low investment, low operation cost, good flexibility, etc. It is estimated that injection metallurgy will find more and more use in the steelmaking industry during the 80's.

9717
CSO: 4009

AUTHOR: YU Hang [0151 5300]

ORG: None

TITLE: "Ten Years After the Launching of China's First Satellite"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese Vol 2 No 10, 16 Oct 80 pp 3-5

ABSTRACT: On 24 Apr 70, China launched successfully for the first time an artificial satellite, Dongfanghong-1 to establish a foundation for her space technology. In the 10 years since, a total of 8 satellites have been launched and the successful return of satellites to the earth's ground surface especially signaled the progress of her space technology in the past decade. A control network for ground surface surveying, a computer center, a launching platform, a base of considerable size for satellite research, production, and large scale environmental experiment, and a team of young space technology scientists are all achievements in the past 10 years. This paper reviews briefly these accomplishments, the 2 types of carrier rockets used to launch these satellites, and the instruments that dispatch telecommunication signals to control the rocket operations. There is also a section in the paper discussing future development in China in satellite communication, resources surveying, earthquake, environmental pollution, forest fire, crop condition observation. Feasibility of using satellites for archaeological research, weather forecasting, etc. is also briefly mentioned.

AUTHOR: LUO Zengyi [5012 2582 0034]
DENG Wenhai [6772 2429 3189]

ORG: Both of Institute of Sonics, Chinese Academy of Sciences

TITLE: "A Oil-saving Whistle--X Type Cantilever Reed Whistle"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese Vol 2 No 10, 16 Oct 80 pp 13-14

ABSTRACT: This paper describes the X type cantilever reed whistle made of steel, measuring 3 cun in length and weighing no more than 2 jin. If the whistle is installed in such a position so that fuel oil and water flow through the whistle in a high speed, the oil and the water will receive a supersonic treatment to become extremely finely grained and very homogenized emulsion, and a very good fuel. If crude oil is thus mixed with water to make a fuel for burning, a saving of 5-10 percent may be obtained. This paper explains the secret of producing supersound by this type of whistle and the method of determining the various parameters of the supersonic treatment process.

AUTHOR: YANG Huayu [2799 5478 3254]

ORG: Beijing Anding Hospital

TITLE: "Combining Psychology and Medicine to Give Birth to Psychosomatic Medicine"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese Vol 2 No 10, 16 Oct 80 pp 15-16

ABSTRACT: The author claims that the influence of psychological factors on the health and diseases of the human body had been recognized in Chinese traditional medical classics. In modern times, more attention is given to this influence. Since the 1930's, some diseases have been understood to be caused by psychological factors to a large degree and they are called psychosomatic diseases and their study is called psychosomatic medicine. This paper explains the relationship between anger and hypertension, coronary disease and the patient's personality, emotions and the activation of malignant cells, mood and stomach ulcer, emotional reactions of the skin, etc. Other diseases, such as migraine, arrhythmia, hyperthyroidism, ulcerative colitis, obesity, psoriasis, etc. are also known to be related to psychological factors.

616:8
CSO: 4009

AUTHOR: WANG Jianju [3769 1696 5282]

ORG: Department of Mathematics

TITLE: "Extension of Real Number System and Generalization of Limit Operation"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 1-9

TEXT OF ENGLISH ABSTRACT: In this paper, the real number system R is extended by means of real number sequences. Let m denote the set of bounded real number sequences, $(x_1, x_2, \ldots, x_n, \ldots)$, and s denote the set of real number sequences $(x_1, x_2, \ldots, x_n, \ldots)$. Suppose $\theta = \{(x_1, x_2, \ldots, x_n, \ldots) : \lim_{n\to\infty} x_n = 0, x_n \in R, n = 1, 2, \ldots\}$. It is shown that the factor space $K = m/\theta$ and $G = s/\theta$ are proper extensions of R.

The homomorphic mapping L from s onto G has the following property

$$L(x) = \lim_{n\to\infty} x_n,$$

where $x = (x_1, x_2, \ldots, x_n, \ldots)$, $\lim_{n\to\infty} x_0$, $x_0 \in R$. The mapping L is called a limit operator.

The algebraic and topological structure of K and G is discussed.

AUTHOR: ZHUANG Qiongshan [5445 8825 3790]

ORG: Department of Mathematics

TITLE: "The Second Boundary Value Problem for Degenerate Parabolic Equations"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 10-25

TEXT OF ENGLISH ABSTRACT: In this paper the second boundary value problem for degenerate parabolic equations in a bounded domain $Q = \Omega \times (0,T]$ is considered.

$$\text{(I)}\quad \begin{array}{l} Lu \quad a^{ij}(x,t)u_{x_i x_j} + b^i(x,t)u_{x_i} + c(x,t)u - a(x,t)u_t = f(x,t) \text{ in } Q \\ \dfrac{\partial u}{\partial v} - \psi(x,t)u = 0 \text{ on } S = \partial\Omega \times (0,T] \\ u(x,0) = 0 \end{array}$$

where $\frac{\partial}{\partial v} = \gamma_1(x)\frac{\partial}{\partial x_1} + \ldots + \gamma_n(x)\frac{\partial}{\partial x_n}$, $\sum_{i=1}^{n} \gamma_i^2(x) = 1$

Under the following assumptions: $c(x,t) \leqslant 0$, $\psi(x,t) \geqslant 0$ and for any $\xi = (\xi_1, \ldots, \xi_n)$,

$$\mu(x,t)|\xi|^2 \leqslant a^{ij}\xi_i\xi_j \leqslant \nu_1(x,t)|\xi|^2, \quad \mu(x,t), \nu_1(x,t) \geqslant 0$$

and $a(x,t) + \mu(x,t) \geqslant \mu > 0$ for all (x,t) in $\bar{Q}$, by the method of regularization

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 10-25]

and priori estimate for the solutions of the second boundary value problem for parabolic equations, the existence and uniqueness theorem of the solution for problem (I) has been proved.

AUTHOR: HUANG Zhongqi [7806 6850 0892]

ORG: Longyan Teacher's University

TITLE: "The Decomposition of a Sphere with Respect to a Measure"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 26-30

TEXT OF ENGLISH ABSTRACT: Let $S^n(n \geq 2)$ be an n-dimensional sphere, and μ be a positive Radon measure on S^n such that $\mu(S^n) = 1$. A subset of S^n will be said to be *too big* if it is of a measure greater than 1/2. A subset of S^n will be said to *crumble* if no component of its complement is too big.

In the present paper the following theorem is proved:
Theorem: Suppose that A is a measurable set on S^n and every component of A is open relative to A, then either A or S^n-A has a component which crumbles S^n.

An example is given to show that in the above theorem the assumption of the relative openness percentage of every component of A cannot be omitted.

AUTHOR: YE Rengui [5509 1103 4097]

ORG: Department of Physics

TITLE: "On the Spectral Line Splitting From a Rotating Light Source"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 31-33

TEXT OF ENGLISH ABSTRACT: It is easy to prove that each of the spectral lines from a rotating light source would split into two or three components similar to those of the classical Zeeman effect. Such a spectral splitting effect might be used to detect the spinning of stars, especially those rotating rapidly and emitting radio waves, e.g., pulsar PSR0531+21 in the Crab nebula.

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WU Baichang [0702 2672 2490]
HUANG Xiangjin [7806 4382 6855]
HUANG Yihao [7806 0076 1170]

ORG: WU Hejun of the Department of Physics, Xiamen University; GAO, WU Baichang, HUANG Xiangjin and HUANG Yihao all of Fujian Materials Structure Research Institute, Chinese Academy of Sciences

TITLE: "$LiNbO_3$ Optical Modulators at High Information Rates"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 34-44

TEXT OF ENGLISH ABSTRACT: A lithium niobate ($LiNbO_3$) optical modulator at high information rates has been designated by considering its configuration and stability, synchronous bandwidth, modulation efficiency, extinction ratio, insertion loss and modulated crystal size. The cutting and polishing of electrooptic crystals are described, and the adjustment technology of the modulator and its performance test are discussed. The combination modulator is developed, of which the characteristics, in general, have that the half-wave retardation voltage is 35V operated at a wavelength of 0.63μ, the extinction ratio is better than 17dB, the transmission factor is more than 38 percent, the capacitance is 30pf and the theoretical (calculated)

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 34-44]

synchronous bandwidth is approximately 700 MHz. In addition, the piezoelectric resonance is damped. The modulator was found satisfactory in the combined experiment on PCM visible telephone communication by means of an optical fiber link.

AUTHOR: ZOU Dongliang [6760 2767 2733]

ORG: Department of Oceanography

TITLE: "The Nature of Points of Inflection on the V-I Curve in Electrodialysis"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 45-53

TEXT OF ENGLISH ABSTRACT: In this paper the polarization behavior of an ion exchange membrane in electrodialysis was investigated on flow conditions. The nature of two points of inflection on the V-I curve has been cleared. The relationship between the number of the points of inflection and the number of electrolytes in the system has also been established.

AUTHOR: ZHANG Rongkun [1728 2837 0981]
LUO Yinghua [5012 7336 5478]
WAN Zhen [8001 2823]
CAI Weiping [5591 4850 1627]

ORG: All of the Department of Chemistry

TITLE: "Chronoamperometry Determination of Dissolved Oxygen in Seawater Using Oxygen Electrode without a Membrane"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 54-63

TEXT OF ENGLISH ABSTRACT: A new method of determination of dissolved oxygen in seawater using an oxygen electrode without a membrane has been made. Differing from the Clark cell, a new model for the dissolved oxygen probe has been designed with the following features:

(1) Without a gaseous diffusion semi-permeable membrane;
(2) Provided with two gold cathode electrodes (a disc and a ring) and a ring anion-exchange membrane;
(3) Automatic inlet of sample water into the probe not interfered with by air.

By means of this modification, the stability of the probe is increased and hysteresis decreased. The determination procedures and calibration are described. The

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 54-63]

method is fast (a sample/2 min) and accurate (± 1 ~ 1.5 percent) and can be satisfactorily used in the laboratory on ship.

AUTHOR: YAN Sixu [7346 1835 2485]
CHEN Suli [7115 4790 7787]
CAI Hongyu [5591 4767 3768]
et al.

ORG: All of the Department of Biology

TITLE: "Enzymological Studies on Amphioxus Bronchiostoma belcheri (Gray). II. Kinetics of Purified Alkaline Phosphatase"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 64-71

TEXT OF ENGLISH ABSTRACT: An alkaline phosphatase was partly purified from amphioxus by extraction, ammonium sulfate fractionation, pH regulation and gel filtration with Sephadex G-100. Preliminary kinetic studies of the enzyme were undertaken. The results are as follows:

The optimum pH of alkaline phosphatase for the hydrolysis of disodium phenyl phosphate is 10.1, and the optimum temperature is 40°C. The Michaelis-Menten constant K_m is 1.13×10^{-3}M at pH 10.1. Under given experimental conditions, the Michaelis-Menten constant K_m varies with different pH values, whereas the maximal velocity V_{max} remains unchanged, which indicates that the effect caused by the pH is of the competitive type.

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 64-71]

The alkaline phosphate is strongly activated by Mg^{++} ion, but is inhibited by Zn^{++}, EDTA, DFP, 2-mercaptoethanol and PCMB. The Ki's of three inhibitors were determined and were found to be of the noncompetitive type. The marked inhibition of 2-mercaptoethanol on the enzyme suggests that the disulfide bond is essential to the maintenance of the enzyme activity. From the v versus pH plot, the pK value of the dissociation of the active group is 9.82 which suggests that $-NH_2$ group might be an active group of the enzyme.

The energy of activation is 3.16 kcal/mole, and the temperature coefficient Q_{10} (at 30-40°C) is 1.15.

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LIU Yueying [0491 2588 5391]
SHEN Mingshan [3088 2494 1472]
LIN Weixing [2651 4850 5281]

ORG: HUANG, LIU and SHEN all of the Department of Biology, Xiamen University; LIN of Qiaoxing Chemical Plant, Xiamen

TITLE: "Studies on Metabolic Pathways in Relation to the Synthesis of Glutamate in *Corynebacterium crenatum* B-9"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 72-80

EXCERPT FROM ENGLISH ABSTRACT: Some tests were carried out to investigate the activities of enzymes in relation to the synthesis of glutamate in cell-free extracts from secondary seeds and fermenting cultures of *Corynebacterium crenatum* B-9.

NADPH linked glutamate dehydrogenase, aspartate aminotransferase and alanine aminotransferase exhibited marked activities in all extracts. Aspartase can be detected in the early stage of fermenting culture. NADPH linked glutamate synthase reveals an activity approaching 1/10 that of glutamate dehydrogenase. The main route of

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 72-80]

glutamate synthesis in B-9 appears to be via α-ketoglutarate amination catalyzed by glutamate dehydrogenase. It seems that glutamate synthase and aspartase may take some part in the process.

AUTHOR: HUANG Houzhe [7806 0624 0772]
LUO Huiming [5012 2585 2494]

ORG: HUANG of the Department of Biology; LUO of the Department of Oceanography

TITLE: "Preliminary Investigation on the Diet Ingestion and Absorption of *Schmackeria dubia* and *Artemia salina*"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 81-90

TEXT OF ENGLISH ABSTRACT: The diet ingestion and absorption of *Schmackeria dubia* and *Artemia salina* were investigated with the $^{14}C(NaH^{14}CO_3)$ or $^{35}S(^{35}S$-Methionine) labeling techniques and the following results were obtained.

Using labeled *Platymonus* sp. and *Nitzchia closterium* as diet-phytoplanktons, the filtering rate of *S. dubia* as well as of *A. salina* decreases differently with the raising of the diet density within a certain limit, and remains at a lower rate with the raising of the diet density still further. The turning point was found to be near 10^5 individuals/ml in the case of *Platymonus* feeding. The absorbance increases with the raising of the diet density up to a certain level.

The filtering rate, feeding rate and absorbance increase markedly with the development of the animals.

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 81-90]

The absorption efficiency decreases with the increase of the diet density, and remains at a lower level in further raising of the diet density. It seems that superfluous feeding may be encountered in a higher level of diet density.

AUTHOR: ZHENG Meili [6774 5019 7787]
XIAO Jinhua [5135 6855 5478]
ZHENG Weiyun [6774 1792 0061]
et al.

ORG: All of the Department of Oceanography

TITLE: "Studies on the Phototactic Behavior of Cuttlefish (*Sepiella maindroni* de Rochebrune)"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 91-99

TEXT OF ENGLISH ABSTRACT: The photoreceptor of cuttlefish is of the rhabdom type.

The electroretinogram (ERG) of the intact eyes of cuttlefish is a simple cornea negative wave, followed by a positive deflection as the light is turned off. During the course of dark adaptation with different light levels, there are great differences in times to recover the dark adaptation threshold. During the course of light adaptation, the incremental curves by different wavelengths do not show an intersecting tendency. The scotopic spectral sensitivity (S_λ) curve of cuttlefish has its maximum at 490 nm and has no secondary peak. The purkinje shift does not occur when adapting to white or colored light of different intensities.

[Continuation of XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN No 3, 1980 pp 91-99]

The optimum illumination of cuttlefish is within the amplitude between 0.01-10 lux. It is suggested that the phototaxis belongs to the dim light type. The influence of background light on the phototactic ratio of cuttlefish weakens with increasing light intensity.

AUTHOR: ZHANG Jinbiao [1728 6855 2871]
XU Zhenzu [6079 2182 4371]

ORG: ZHANG of the Third Institute of Oceanography, National Bureau of Oceanography; XU of Xiamen University

TITLE: "On the Geographical Distribution of the Siphonophores in the China Sea"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 100-108

EXCERPT FROM ENGLISH ABSTRACT: In the present paper we made a comprehensive study on the species composition and geographical distribution of the Siphonophores in the China Sea. As a whole, 72 species of Siphonophores were hitherto recorded. Among them, one species occurred in the Bohai Sea, 4 in the Yellow Sea, 48 in the East China Sea and 67 in the South China Sea. The ecological characteristics of the Siphonophore fauna in the China Sea were analyzed in detail. Based on this, the Siphonophores in the China seas can preliminarily be separated into the four ecological groups.

AUTHOR: CHENG Zhaodi [4453 0340 4574]
JIN Dexiang [6855 1795 4382]

ORG: Both of the Department of Biology

TITLE: "Notes on Some New Species and New Records of Diatoms from the Strait of Taiwan (Fujian Coast), China"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO--ZIRAN KEXUE BAN [UNIVERSITATIS AMOIENSIS ACTA SCIENTIARUM NATURALIUM] in Chinese No 3, 1980 pp 109-116

TEXT OF ENGLISH ABSTRACT: In the study of diatoms collected from the Strait of Taiwan, the southeast coast of China, three new species, two new varieties of Coscinodiscus and Caloneis, and 60 new records of diatoms of these genera and others were recorded. The new diatoms are:
Coscinodiscus hexagonus Cheng et Chin, sp. nov.
C. paradoxus Cheng et Chin, sp. nov.
C. bathyomphalus var. hispidus Cheng et Chin, var. nov.
Caloneis platycephala Cheng et Chin, sp. nov.
C. elongata var. constricta Cheng et Chin, var. nov.

9717
CSO: 4009

AUTHOR: LIU Baoyin [0491 1405 6892]

ORG: None

TITLE: "Ocean and Liver Cancer"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 10, Oct 80 pp 5-6

ABSTRACT: Early in the 1960's, ten thousand turkeys in England died suddenly. Dissection disclosed the cause of death to be necrosis of the liver. Considerable investigation by many scientists revealed the fact that the death was the direct result of eating moldy peanut powder imported from Brasil and analyses of the peanut powder disclosed its Aspergillus flavus content. While medical scientists had pointed out that flavotoxin B_1 of that mold is most damaging to the liver, this incident provided a shocking evidence of its carcinogenesis. Experimental feeding of moldy peanuts to domestic fowls reinforced the finding. Due to the fact that peanuts of the coastal region become moldy more easily because of the high humidity of the ocean, according to statistical studies of related departments, liver cancer mortality rate of the coastal plains is 3-5 times that of the inland regions. The author explains the relationship of eating moldy food and liver cancer and warns inhabitants of regions of high humidity and high temperature to be especially careful not to eat moldy foods.

AUTHOR: MA Shusen [7456 2885 2773]

ORG: None

TITLE: "Shadowless and Formless Pollution of the Oceans"

SOURCE: Beijing HAIYANG [OCEANS] in Chinese No 10, Oct 80 pp 23-24

ABSTRACT: The oceans have always contained radioactive substances releasing alpha, beta, or gamma rays. Since the first atomic bomb was made by the USA in 1945, various man-made radioactive substances have entered the oceans in massive quantities. The effects of this added radiation and the distribution of man-made radioactive substances in the oceans have become the subject of extensive studies by scientists in the past 2 decades. It is the consensus that the current level of radiation pollution of the oceans has not yet reached the degree to be harmful to fish species, but the radiation level of the regions of the oceans where radioactive wastes have been disposed is already 1000 times higher than the natural level to have caused a reduction of reproductive capacity of many marine species there. The gradual enlargement of these regions with the expansion of utilization of nuclear energy should be an important problem demanding the attention of everyone.

6168
CSO: 4009

AUTHOR: ZHANG Guohua [1728 0948 5478]

ORG: None

TITLE: "A General Linearized Theory for Supercavitating Hydrofoil Sections"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 4, 1980 pp 1-26

EXCERPT FROM ENGLISH ABSTRACT: In this paper, a general linearized theory for the calculations of supercavitating hydrofoil sections in direct problems (in which the shape of the wetted surface is previously prescribed) as well as in inverse problems (in which the pressure distribution on the wetted surface is prescribed) by employing the singularity method is presented.

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ZHOU Liandi [0719 6647 4574]
ZHENG Yongmin [6774 3057 2404]

ORG: None

TITLE: "Experimental Investigations of the Performance of Ducted Propeller Series in Cavitating Conditions"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 4, 1980 pp 27-41

TEXT OF ENGLISH ABSTRACT: Cavitation-tunnel experiments investigating the performance of D-series ducted propellers in cavitating conditions were carried out in uniform flow. The experiments fitting four bladed propellers D-series ($A_E/A_0 = 0.7, 1.0$) to one of the ducts BD15 ($t/L = 0.15$) and BD12 ($t/L = 0.12$) are finished. It was found that the rules of the performance of ducted propellers in cavitation are not completely the same as those of conventional propellers. For each given cavitation number σ_V, there exists respectively a maximum of critical thrust coefficient in the first and second stages of cavitation. The various methods for wall-effect correction were analyzed and the method based on C_{Th} identity is recommended. For calculating the characteristics by computer, the regression coefficients of the experimental results were provided. Some of the regression coefficients and the charts are given in this paper.

AUTHOR: SUN Fuzhong [1327 1788 0022]

ORG: None

TITLE: "On the New Theory and Calculating Method of the Motion of Semi-Submersibles"

SOURCE: Wuxi ZHONGGUO ZAOCHUAN [SHIPBUILDING OF CHINA] in Chinese No 4, 1980 pp 64-78

TEXT OF ENGLISH ABSTRACT: Starting with the analysis of the hydrodynamic forces acting on a three-dimensional cylinder with an axial symmetrical cross section and taking into account the non-linear viscous effect, general expressions for the hydrodynamic coefficients, exciting forces and motion equation are derived. The motion amplitude and phase angle of a semi-submersible in regular waves are solved by means of the iteration method after the non-linear viscous effect was processed linearly.

According to the motion behavior of semi-submersibles in regular waves, it is proposed to employ the concept of equivalent wave height for the calculation of transfer functions based on the linear statistical analysis theory. The long-term distribution characteristics of motion are calculated by conditional probability and by applying the method of probability transformation.

[Continuation of ZHONGGUO ZAOCHUAN No 4, 1980 pp 64-78]

A computer program has been developed. Comparison between model experimental and theoretical data has shown satisfactory agreement.

9717
CSO: 4009

AUTHOR: ZHENG Lianda [6774 5114 6671]
WANG Yiyun [3769 2034 0061]

ORG: None

TITLE: "Using Cold Start Glow Type Fluorescent Lamp to Capture Earthquake Data"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 5, 26 Oct 80 pp 2-4

ABSTRACT: The authors were told by someone in the eastern part of Beijing that when he was awakened by the Tangshan earthquake in 1976, he noticed his fluorescent lamp was turned on by itself and it stayed lit even after he turned the switch off once again. Another person reported the fact that his fluorescent lamp came on by itself and could not be turned off until the following morning. The same phenomenon was reported during an earthquake in the USSR. The authors theorize that during the earthquake process, the increased intensity of cosmic ray causes an increase of electron particles in the fluorescent tube so that the light comes on by itself. Based upon this theory, the authors constructed 3 simple instruments to serve as an earthquake warning system and to record the data during an earthquake.

AUTHOR: CHENG Aihua [4453 5337 5478]
YIN Shilin [3009 0013 2651]
LU Xuezheng [7120 1331 2973]
GUO Yixin [6751 0001 2450]

ORG: None

TITLE: "Ground Water Movement in Liyang Before the Earthquake"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 5, 26 Oct 80 pp 7-8

ABSTRACT: On 9 Jul 79, a 6.0 earthquake occurred between Shangpei Commune and Shangxing Commune, in Liyang County of Jiangsu Province. Just before the earthquake, there were large scale rise and fall of the ground water in the area to reflect the condition of stress-strain under the ground surface. The water table of a well 7 km from the epicenter rose steadily from 20 Jun 79 and a net gain of 2m was recorded just before the earthquake. In another well nearby, water was observed to spill out of the well about 10 minutes before the earthquake started. Other changes of the water of the wells in the area included noise, odor, turbid, spinning, etc. A map of observed ground water anomalies in relation to the epicenter of the earthquake is included in the paper.

AUTHOR: WANG Bingfu [3679 4426 1381]

ORG: None

TITLE: "Monitoring Earthquake With a Combined Carbon and Sulfur Test Instrument"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 5, 26 Oct 80 p 17

ABSTRACT: The author and colleagues used a combined carbon and sulfur test instrument to determine the carbon and sulfur contents of iron and steel. The instrument utilizes carbon dioxide and hydrogen sulfide of the ground water and volatile acid to produe a reading. Normally, on dry runs without specimens, the reading is 0. Occasionally, a 1-3 reading may appear for one to several days, but will return to 0 afterwards. From 11 Sep to 12 Oct 79 the dry run readings fluctuated from 3 and 18 and stayed that way throughout that month. Two earthquakes occurred to the southwest of Zhangjiakou at 21'25" and 22'48" on 11 Oct 79, and15 earthquakes occurred from 11 to 14 Oct 79. The epicenter of these earthquakes was only about 10km from the deep well (more than 80 m in depth) from which the water was used for the tests. The author concludes that high contents of carbon dioxide, hydrogen sulfide, and volatile acids of the ground water related to these earthquakes had caused the abnormal readings of the test instrument.

AUTHOR: SHANG Hongkuan [0794 1347 1401]

ORG: None

TITLE: "Brief Introduction of Seismologic Geology of the Sanxia [Three Gorges of the Yangzi] Region"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 5, 26 Oct 80 pp 20-21, 29

ABSTRACT: At present The Gezhouba Dam under construction is located below Sanxia. When it is completed, it will generate electricity by the flow of the Yangzi to a capacity of 3000-2500 Mw and that will make it one of the largest power plant in the country. If a 200 m high dam should be built in the Sanxia region, it may have a capacity of 30,000-25,000 Mw and should change the power shortage situation of the country by itself. The important problem of such a hydroelectric power plant is the problem of regional stability. A study of the seismologic geology of the Sanxia Region is, therefore, very significant. The facts concerning this region's gradual change from weak to a strong earthquake region and its geological background are briefly discussed.

AUTHOR: FAN Guangwei [5400 1684 0251]

ORG: None

TITLE: "Flashes of Light Preceeding an Earthquake and Ion Radiation"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 5, 26 Oct 80 p 38

ABSTRACT: There have been reports of engineers taking emergency measures when they saw flashes of light just before the Haicheng earthquake of 75 as well as the Tangshan earthquake of 76. They were able to save lots of lives due to the flashes of light warning. There are many speculations concerning the origin of these flashes. This paper reports an experiment in an unnamed foreign country with rock specimens placed in a press. As the pressure increased, a current measuring 10^{-10} amp was detected. When the rock specimen was about to break and the current measured 10^{-11} amp, electrons of an energy of 15 ev and positive ion radiation were observed. If the rock specimen was in an helium environment, flashes were not observed, but if the specimen was in an environment filled with water vapor or oxygen, the phenomenon of flashes of light was observed as the electrons and positive ions caused the water molecules or the oxygen molecules to be excited and to irradiate photons.

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CSO: 4009

END

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24 December 1980

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No. 73

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24 December 1980

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SCIENCE AND TECHNOLOGY

No. 73

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APPLIED SCIENCES

SMALL MULTIPLE TERMINAL NETWORK OF DJS-130 COMPUTER ASSEMBLED

Beijing DIANZI KEXUE JISHU [ELECTRONICS SCIENCE AND TECHNOLOGY] in Chinese No 9, 9 Oct 80 pp 30-33

[Article by Fang Cunzheng [2455 1317 2973] of Shanghai Normal University: "Introduction to the Small Multiple Terminal Network of the DJS-130 Computer"]

[Text] General Description

In the past, when we used computers, we followed the method of one user using one computer. This method of a single user occupying one computer did not allow the full utilization of the high speed automatic computational capabilities of the computer. The method is unsuitable for the situation of an ever increasing popularization of the computer. In particular, more and more demands on learning and using computers in teaching and scientific research are being made, therefore it is very necessary to change the method of using computers and to fully utilize the potential efficiency of the computer.

We have assembled a network of small terminals for the DJS-130 computer at school and set up many terminals at places far away from the location of the mainframe machine. In this way, the users can directly use the computer housed at a far distance from their own offices or laboratories. The system as set up at present is shown in Figure 1.

The mainframe DJS-130 has a main memory at present of 20K. The major peripheral equipment in the mainframe computer room is a paper tape puncher and control panel typewriter. The multiplex communicator interface has 4 to 6 terminals.

The terminal equipment can be a five-unit teletypewriter or an eight-unit teletypewriter (such as a pin printer) or it can also be an eight-unit character display. Ordinarily, the terminal equipment of a computer must have a keyboard as a means for input and a printer or a display as a means of output. Because the character display has the advantages of high speed of transmission, low noise and certain editing capabilities, therefore we used the XZX - 1 model eight-unit character display as one of the small multiple terminal network's terminal equipment.

The following is a brief introduction to the problems of multiple terminal processing and long line transmission.

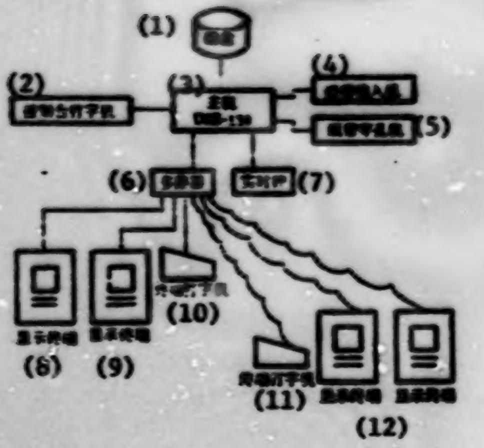

Figure 1.

Key:

(1)	Magnetic disc
(2)	Control panel typewriter
(3)	Mainframe
(4)	Paper tape input device
(5)	Paper tape puncher
(6)	Multiplexor
(7)	Real time clock
(8)	Display terminal
(9)	Display terminal
(10)	Terminal typewriter
(11)	Terminal typewriter
(12)	Display terminal

The Problem of Multiple Terminal Processing

To realize multiple terminal processing, a combination of hardware and software is required.

Each terminal needs two parts, an input (keyboard) and an output (display or printer). Therefore they must each have two interfaces with the computer. One is the receiving unit connected to the keyboard for input of data to the mainframe. The other is the transmitting unit connected to the display or the printer for the mainframe's output of data.

The entire set of multiple terminals is taken as a whole and joined to the interrupt units of each part of the peripheral equipment by queuing via a multiplexor. It occupies one device code (30). Inside the multiplexor, the problem of queuing of the terminals also exists. Their interrupt priorities are determined by the queuing circuits inside the multiplexor. In the mainframe, a method of "device numbering" is used to identify which terminal has requested input and output. Each terminal unit is assigned a "station number." This "device code" is input and output together with the character coded information when executing input and output commands. For the DJS-130 machine, the word length is 16 digits, thus the information for transmitting one word is arranged as follows:

		device number	character number
0	1	2 7	8 15

The mainframe uses three input and output transmission commands to exercise control over input and output of the multiplex terminals. One is the input command. The second is the output command. The device code of the multiplexor is (30) and the memory code is AHM. The receiver and transmitter of each terminal have their own "ready" indicator. The "reception ready" indicator and "transmission ready" indicator are also input together with the codes when executing the input command for the mainframe to decide. The input and output commands can also be used to clear these two indicators.

Input command DIAC---, AHM

0 1 1	A C	0 0 1 1 0	0 1 1 0 0 0
0 1 2	3 4	5 6 7 8 0	10 11 12 13 14 15

This command processes the input of the character codes. It reads in the terminal interrupt message which is in a reception or transmission readystate and which has received interrupt priority and the "reception ready" indicator of this station number is cleared. The content of the AC full adder being read in is:

		device number	character code
0	1	2 7	8 15

The 0 digit: The "reception ready" indicator is 1, indicating that the terminal represented by the station number shown in the 2nd to 7th digits already has input codes. The input codes are shown by the 8th to 15th digits.

The 1 digit: The "transmission ready" indicator is 1, indicating that the terminal represented by the station number shown in the 2nd to 7th digits already has completed the transmission of codes and is waiting to transmit the next code.

The 2 to 7 digits: They indicate the code of the device which has received the highest priority and which has been set by the "ready" indicator.

The 8 to 15 digits: When the 0 digit is 1, it indicates that a code is received. When the 0 digit is 0, it is void.

Output command DOA---, AHM

0	1	1	A	C	0	1	0	0	0	0	1	1	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

This command processes the output of character codes. It sends the codes to be output from the mainframe to the transmitter of the designated station number and clears the "transmission ready" indicator of the terminal of this station number. As described above, the character code and the designated station number at this time are all in the AC:

		device number	character number
0	1	2 7	8 15

Output command DOB---, AHM

0	1	1	A	C	0	1	0	0	0	0	1	1	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

This command clears the "transmission ready" indicator of the terminal, with the station number designated by the 2nd to 7th digits in the AC. It does not execute output of the codes.

Figure 2 is an illustrative block diagram of the logic of the connections of the signals between the multiplexor interfaces and the mainframe and terminal equipment. Its operational process is generally as follows: During input after the keys on the keyboard have been pressed, the receiver shifts the serial codes transmitted by the keyboard digit by digit into the shift register. After the code has been completely shifted into the register, the "reception ready" indicator trigger is set, indicating this shift has been completed. During output after the transmitter has completed shifting the parallel codes sent by the mainframe into the shift register, the serial shift is sent to the printing or display unit. When the shifting of the codes is completed, the "transmission ready" indicator trigger is set. When the "reception ready" or "transmission ready" indicator trigger of any terminal is set, and under the control of the status trigger, an interrupt request ZDQQ signal is sent to the mainframe. At this time the entire multiplexor makes the request to the mainframe as a whole unit. After the mainframe responds to the interrupt signal, a ZDXW signal is sent and when it receives an interrupt priority by queuing in the multiplexor, the device code (30) is sent to the mainframe, via the input bus MX_R. Thus, the mainframe enters into a service routine of executing the interrupt signals of the multiplexor.

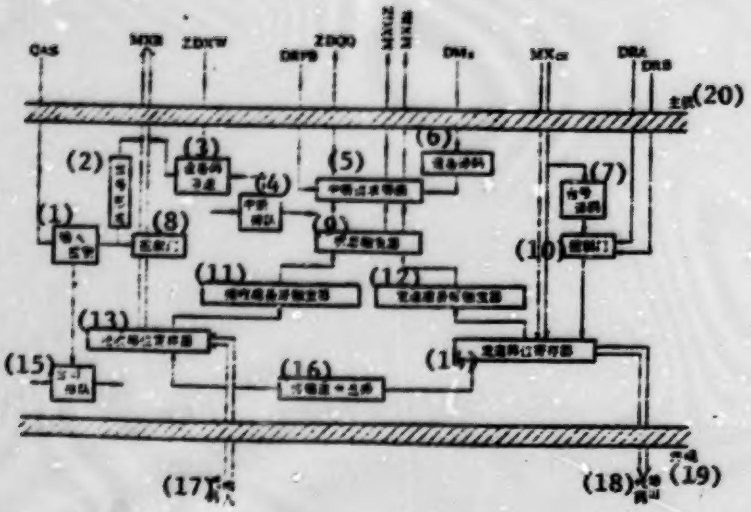

Figure 2.

Key:

(1)	Input control	(11)	Reception ready trigger
(2)	Formation of station number	(12)	Transmission ready trigger
(3)	Sending back equipment (device) code	(13)	Reception shift register
(4)	Interrupt queuing	(14)	Transmission shift register
(5)	Interrupt request masking	(15)	Queuing between stations
(6)	Device decoding	(16)	Transmission speed selection
(7)	Station number decoding	(17)	Code input
(8)	Control gate	(18)	Code input
(9)	Status trigger	(19)	Terminal
(10)	Control gate	(20)	Mainframe

The illustrative block diagram of interrupt processing is shown in Figure 3. First, the DIAC---, AHM command sends the interrupt signal in the receiver of the terminal that has made an interrupt request and that has obtained interrupt priority via the input bus MX_R into the mainframe and clears the "reception ready" indicator trigger in that terminal. Then the 0 digit of the message is recognized and taken in by the mainframe. If the 0 digit is 1, then reception ready is indicated. The mainframe thus knows by the device code taken in which terminal has input the character and will carry out the corresponding processing of the input character codes. After the "reception ready" indicator has been cleared, the initial state is restored to wait for the input of the next character. If the 1 digit is 1, transmission ready is indicated. Thus the mainframe uses the DOBO AHM command to clear the "transmission ready" indicator and enters into transmission processing AHOUT. When the mainframe wants

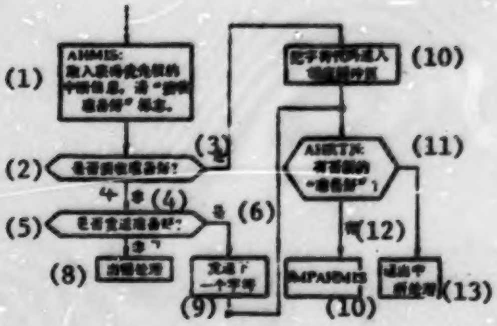

Figure 3

Key:
(1) AHMIS: Accessing interrupt signals having priority, request "reception ready" signal
(2) Whether reception ready or not?
(3) Yes
(4) No
(5) Whether transmission ready or not?
(6) Yes
(7) No
(8) Processing of error
(9) Sending the next character
(10) Sending character codes into corresponding buffer zone
(11) AHRTN: Are there any new "ready"?
(12) Yes
(13) Withdraw from interrupt processing

that terminal to execute output operations, the mainframe sends out a DOA---, AHM command, the device code in the corresponding accumulator of the mainframe is sent to the multiplexor via the output bus MX_{cx2-7} and transmits the entry signal to send the code to the output into the shift register via the bus MX_{cx8-15}. After each digit of the code has been shifted out, the "transmission ready" indicator is set again. The above process is thus repeated. After completion of one receiving or transmitting process, the program enters a return process AHRTN, a check is conducted to see if there are any other interrupt requests from other terminals. If there is, then an AHMIS is executed. If there are no new requests, the program withdraws from interrupt processing.

The work concerning the multiplexor interfaces has been described in an article entitled "A Plan for Multiplex Terminal Interfaces of the DJS-130 Computer" published in the fourth issue of 1978 of "Electronics Science and Technology."

After the plan for the hardware has been determined, the problem of the method of connecting the terminal user and the system is solved only. To enable many users to realize on line operation simultaneously, there must be software to realize management of and time sharing for each user. At present we have installed a multiple user expanded BASIC magnetic disc on the small terminal network. This system utilizes time sharing to manage the operations of the users of multiple terminals. A maximum of 16 users can be allowed to use the expanded BASIC language to solve problems on their own terminal equipment simultaneously. This interpretive program itself takes up 10K of main memory and the remaining main memory area is distributed to each terminal user allowed to operate the machine as working area. In this way, if the main memory has 32K and 16 users are allowed to operate the machine, then each user can be given about 1.4K of the main memory area. As regards time in realizing time sharing, this system divides time into several time rules. Each time rule is 160mS. The mainframe provides time to each terminal user to use in turn according to the time rules and executes the programs currently being executed by the user. Using such time rules, the system can respond to the requests of each end user more effectively. When all 16 users work on line simultaneously, the delay between two runs of a user's program is about 2.5 seconds. In this way, each user feels as if he is using the mainframe for computations alone within his own alloted time rule and utilizing a shared systems program at his own fixed place of work.

The installation of a real time clock is to provide the system with a time standard. The real time clock sends one interrupt request to the mainframe every 10 seconds to systematically count time. The system records the time each user uses the mainframe and the peripheral equipment according to the time signals provided by the real time clock. It then produces the 160mS time rule to implement management of time sharing for each user. When there is a far away terminal, the call signals of the far away user can also be inquired and answered at fixed intervals.

Let us talk about the problem of time estimation for the mainframe to respond to interrupt signals when the system is carryout out multiple terminal processing. We assume that each interrupt service program has an average of 50 commands and each command would require 5 μS of time, then processing one interrupt signal requires 50 X 5 μS = 250 μS. When all 16 terminals are connected, one round of processing all input and output interrupt requests requires a total of 2 X 16 X 250 μS = 8mS. For the keyboard input, the time interval of pressing 2 keys is about 250mS. This is sufficient to process the interrupt signals of 16 terminals. For the output, if a transmission speed of 1200 baud is used, the shiting of each digit of a character requires about 0.83 mS X 11 = 9.13 mS. Even with the addition of other control codes, the time is sufficient to process the interrupt requests of 16 terminals, and the work efficiency of the terminal equipment will not be lowered too much. Observation of actual use shows that when the output is higher than 1200 baud, the output will not realize a faster speed because of the inherent limitations of the processing capabilities of the mainframe itself. Therefore, this system is best suited for a transmission speed of below 1200 baud. When the system reschedules the peripheral equipment, processing at each terminal clearly slows down.

The Problem of Long Line Transmission

For lengths longer than several dozen meters, connecting the terminal equipment to the computer with a double strand wire for each digit when the parallel code transmission method is used is obviously very unsuitable. Therefore the serial code transmission method is generally used, such as the teletypewriter and the character display. The terminal and the computer are connected by an asynchronous operational mode, i.e., a start-stop method. The standard input and output equipment with keyboard uses an 11-digit coding of each character. One digit is the startup digit and 8 digits are message digits (of which 1 digit is parity number) and 2 digits are stop bits.

When using serial code transmission, generally only two signal lines are sufficient between the terminal and the mainframe. One line is the code signal line for transmission from the terminal to the mainframe. The other is the code signal line for transmission from the mainframe to the terminal. Some terminal printers that require an additional control signal line such as the DZM180KSR model pin printer poses a 256 unit buffer memory. When this buffer memory is temporarily full, a control signal has to be transmitted to stop the mainframe from sending more codes to the printer. These transmission lines all use double strand wires. For far away terminals over 100 meters distant we set up special transmission lines. These lines use ordinary 2 x 42/0.15 polyethylene insulated electric wire as the double strand wires. The transmission voltage on the line generally should be 15 to 20 volts, the line current is about 20mA. According to the standards of the computer, such an electrical balance of signals is very large, but there are great advantages to the transmission function. It enables the terminal to resist the effects of electrical resistance of more than several hundred meters of wire while the accuracy of data transmission is not affected. This is because smaller noise or interfering voltage will not affect the code signals being transmitted. Conversely, if a lower signal electrical balance is used, such as 2 to 3 volts, interfering signals may completely destroy data transmission. Another advantage is that this type of circuits can provide a constant source of flow. It does not depend on long wire resistors. This type of circuits is often called "20mA current loop circuits." Figure 4 illustrates the principle of conversion between the interfaces of the computer and the "20mA current loop circuit."

To overcome common mode interference, the best method is to electrically insulate the interface between the transmission line and the computer completely. Good results can be obtained by using photoelectric couplers. Photoelectric coupling involves putting an emitting diode and a silicon photoelectric triode together. Code transmission is realized by light. The coupling between input and output has only 0.5 to 2pF of capacitance. The largest data transmission rate is determined by the frequency response of the photoelectric triode (which can reach several dozen to over 100 kilohertz). Such a frequency response is entirely sufficient for connecting the keyboard, printer or display screen and the computer. We have used the 3EDK62 model photoelectric coupler. Its circuit is illustrated in Figure 5.

After taking the above measures, the distance between the computer and the terminal equipment can be as distant as over 2 kilometers. At present, we have set up three relatively distant terminals in the school for use by the physics, chemistry and biology departments. Via the long line, the connecting circuit between the computer and the terminal equipment is shown in Figure 6.

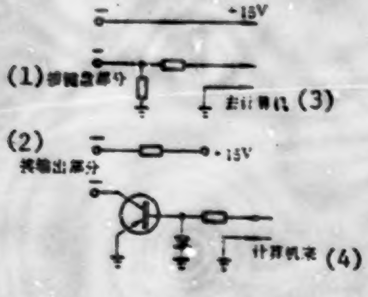
+15V
(1)接键盘部分
去计算机 (3)
(2)
接输出部分
+15V
计算机来 (4)

Figure 4

Key:
(1) Connected to the keyboard
(2) Connected to the output
(3) Goes to computer
(4) Coming from the computer

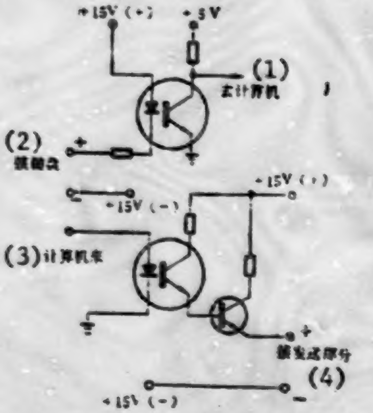
+15V (+)
+5V
(1)
去计算机
(2)
接键盘
+
+15V (+)
+15V (-)
(3)计算机来
+
接发送部分
(4)
-
+15V (-)

Figure 5

Key:
(1) Goes to computer
(2) Connected to keyboard
(3) Coming from computer
(4) Connected to transmission

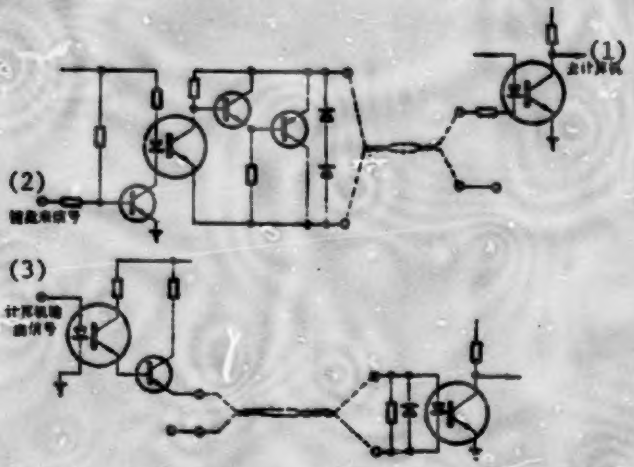

Figure 6.

Key:
(1) Goes to computer (2) Signal from keyboard (3) Output signal from computer

The success of the experiment of the small multiple terminal network gave us the opportunity for a preliminary attempt in the realization of a computer network and definite material preparations have been made for further work. At present, we have also added a magnetic disc storage onto this system and are preparing corresponding software and other hardware to launch further work.

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DJS-130 COMPUTER QUALITY EVALUATION RESULTS REVEALED

Beijing DIANZI KEXUE JISHU [ELECTRONICS SCIENCE AND TECHNOLOGY] in Chinese No 9, 9 Oct 80 p 29

[Article by correspondent of the National Computer Industry Administration: "National DJS-130 Computer Quality Evaluation and Comparison Results Are Revealed"]

[Text] Our nation's first DJS-130 computer quality evaluation and comparison event was held. After 47 days of evaluation and comparison, the results were made public in Tianjin on 15 July 1980. The Shanghai Computer Plant, the Suzhou Computer Plant, the Tianjin Radio Plant No 2, were awarded first prize. The Weifang Computer Plant No 6, Changzhou Radio Plant No 2, Yunnan Electronics Equipment Plant received praise in the evaluation and comparison of learning and emulation.

A total of 14 machines from 7 production facilities in the 5 provinces and cities of Beijing, Tianjin, Shanghai, Jiangsu and Shandong participated in the overall evaluation and comparison. Four production facilities of the four provinces of Shanxi, Jiangsu, Henan and Yunnan participated in the evaluation and comparison for learning and emulation. The emphasis of this evaluation and comparison show was to inspect reliability of the machines. The items of evaluation and comparison were stability experiment of continuous operation for 720 hours, inspection of function, inspection of capabilities of forming whole systems, inspection of technical structure and inspection of cost. In the evaluation and comparison, 3 machines of 3 plants operated without malfunction continuously for 1,000 hours and they were turned off manually. Six other machines continuously operated for 500 hours to over 800 hours. The machines that participated in the evaluation and comparison basically all passed the inspection of function.

The results of this evaluation and comparison event show that the domestically produced DJS-130 computer's reliability, stability and capability for forming whole systems visibly improved and the cost dropped, reflecting progress over the past several years in our nation's computer industry.

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CSO: 8111/0196

TYPES OF DATA DISPLAY SYSTEMS OUTLINED

Beijing DIANZI KEXUE JISHU [ELECTRONICS SCIENCE AND TECHNOLOGY] in Chinese No 9, 9 Oct 80 pp 40-41

[Article by Cheng Changfu [4453 7022 4395]: "Electron Beam Tube and Computer Technology"]

[Text] Since 1960, a brand new technological field in peripheral equipment that further enhanced the functions of computers rapidly developed--data display systems. They include character display, graphic display and composite display of text and background graphics. The displays were also equipped with such electronic input devices as voltage pen, photosensitive pen and word recognition devices. Data display systems made conversation between man and machine more graphic and convenient.

Main Display Devices in Data Display Systems

The main display devices of the display of a computer are the various types of cathode ray tubes (abbreviated CRT). There are many types as described in the following:

1. To enable the deflection component to simultaneously have the two functions of registration and character generation, a double deflection CRT is used. It can be assembled in two ways. The first is an electromagnet-electromagnet type. The other is the electromagnet-static type. When using the electromagnet-electromagnet type, registration on the fluorescent screen is realized by a coil having a high electrical sensitivity. Character generation is realized by a coil that has a low electrical sensitivity so that the scanning response speed of characters can be increased. When the electromagnet-static deflection is used, electromagnet deflection is used to realize registration while static deflection is used to realize character generation.

2. The multiple electron gun that can display two or more messages and data simultaneously. The static dual gun's typical application is as follows. One electron gun is used to generate radar data. The other electron gun is used to generate computer data.

3. To increase the capacity of the message, a color CRT is used. Fluorescent powder of various colors is used to display different data that is to be differentiated so that the various data zones are clearly different. There are two

types of color CRT: one is a cathode shielded color image reproducer. The other type is a voltage penetration type multicolor image producer. The voltage penetration type fluorescent screen also includes two types, a wrapped fluorescent screen with multiple colored layers and a lined fluorescent screen. There is another type of current sensitive multicolor image reproducer under research. The structure of the voltage penetration type multicolor image reproducer is much simpler than that of the cathode shielded color image reproducer. It uses only one electron gun to achieve color displays. When the high screen voltage is switched over at high speed within a definite range, electron beams of different acceleration energy penetrate and excite the fluorescent powder to emit many different colors of red, orange, yellow and green and afterglow. There are many varieties of voltage penetration type multicolor image reproducers abroad. The full screen resolution of this type of electron tubes can generally reach 1,600 lines, brightness can reach 150 Nit. When the high screen voltage is switched over at 6 kilovolts to 14 kilovolts, 4 to 5 colors can be obtained or the afterglow can be changed.

4. High resolution CRT is suitable for photographically recording data or as fly-point scanning of a light source (such as a word recognition device). This type includes the fiber optics surface board CRT. Because a fiber optics surface board is used as the surface board of the fluorescent screen, its transparency is high, its light gathering ability (numerical aperture) is large and image distortion is small. The optical fiber used to make the surface board has a diameter of from 5 to 10 micrometers each. This type of electron tubes can scan light spots of several micrometers to about 20 micrometers. There is a type of flat line scanning tube encased in a glass shell. Its optical fiber surface board is a rectangular narrow band type. It records one line of data photographically each time.

5. To overcome the shortcoming of short afterglow of the ordinary CRT, the computer uses a direct view storage tube (abbreviated DVST). This type of electron tube has a longer-storage time under strong brightness (generally several hundred times or more than the brightness of ordinary display tubes) and the afterglow can be changed. The advantage of the DVST data display is that it need not interrupt the computer frequently because of renewal of data. To selectively clear partial data from the fluorescent screen a selective clearing or multiple state DVST can be developed. The storage method of DVST generally can use a half tone (gray scale type) or a bistable (black and white type) mode of operation. The bistable electron tube is mainly used for wave form display while the half tone is used where a gray scale is required. The DVST is a kind of structurally complex electron beam tube. It generally consists of four parts, a gathering network--energy storage target network--fluorescent screen, correction system, reading electron gun and a recording electron gun. The ordinary recording speed can reach several dozen thousand meters to several million meters per second (if the so-called projection type energy storage CRT made from a post magnification electron lens is used, the recording speed will be higher). The saturation brightness of the fluorescent screen can reach 4,000 meters lambert and above (the saturation brightness of the cathode shielded color image reproducer is generally above 100 meters-lambert). The effective image time or called the changeable afterglow

can reach 10 seconds to 1 hour. DVST's resolution and the line density of the energy storage target net are closely related, generally the diameter of the light spot can reach 0.25 millimeter to 0.75 millimeter. DVST message storage can last from several days to about 1 week.

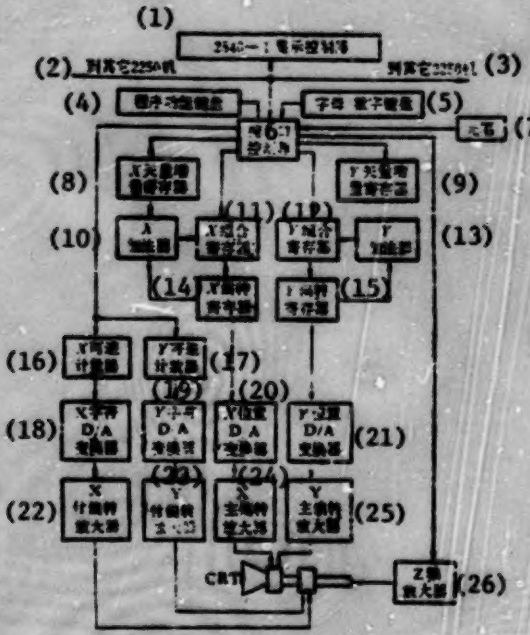
6. Single gun or multiple gun electrical output storage tube and the scan switchover storage tube can store input data with one speed while the other speed is used to provide electrical signal output.

7. The electron gun of the character code tube formed in the character tube is of the dual cross type electron gun. Its major difference from other CRT is that in its electron optics system, an etched and hollowed out thin metallic sheet with numbers and symbols on it called the "character font" is in its electron optics system in the character code tube.

Display Terminals of the Computer

The data display terminals of computers are mostly rectangular screens. In general, P19 (orange red) and P39 (green) long afterglow fluorescent powder are used because they have a low frequency of glare and they are easy on the naked eye. To increase the message capacity within definite dimensions of the screen, the resolution of the electron gun must be further increased. Japan's Matsushita Company produced the 340BAB39 model data display tube using P39 fluorescent powder on its fluorescent screen. The screen is only 14 inches but the maximum resolution of its static focus electron gun can be as high as 1800 lines. Generally this type of electron tubes uses electromagnetic deflection. Because the comprehensive (trend) display of the activity on the computer terminal operates in a random scanning mode, the angle of deflection should not be too large to reduce deflection power and deflection coil's electrical sensitivity and to increase the rate of deflection response. It is generally 40° to 70°. This is because an overly large deflection angle will cause nonlinear distortion and deflection focus out. To assure the high clarity and high quality of the image on the whole screen, it is hoped that even large screen data display tubes have a small deflection angle. For example, the deflection angle of the 9-inch dim light spot tube manufactured by Britain's Ferranti Company is only 40°. The deflection angle of the 5-inch high resolution tube of the Sylvania Company of the United States is 50°. When consideration is given to the fast deflection response speed and the conservative deflection power of the static deflection oscilloscope, the development of large screen rectangular oscilloscopes to be used as data display tubes is a direction.

The terminal of a large computer can be fitted with many display heads via appropriate interfaces. This can fully develop the efficiency of the machine. The block diagram of the IBM2250 display developed by IBM of the United States is shown in the diagram. It operates jointly with the IBM2840-2 model display control to produce data display (including letters, numerals and graphs). It uses a 21-inch double reflection type CRT with an effective viewing area of 12 inches X 12 inches as a display device. The CRT fluorescent screen uses 1024 X 1024 matrix of fixed points.



IBM 2250 display block diagram

Key:

(1)	2481-1 display controller
(2)	To other 2250 machines
(3)	To other 2250 machines
(4)	Program function keyboard
(5)	Alphanumeric keyboard
(6)	Interface controller
(7)	Photopen
(8)	X vector increment register
(9)	Y vector increment register
(10)	X adder
(11)	X assembly register
(12)	Y assembly register
(13)	Y adder
(14)	X deflection register
(15)	Y deflection register
(16)	X reversible counter
(17)	Y reversible counter
(18)	X character D/A transformer
(19)	Y character D/A transformer
(20)	X position D/A transformer
(21)	Y position D/A transformer
(22)	X auxiliary transform magnifier
(23)	Y auxiliary transform magnifier
(24)	X main transform magnifier
(25)	Y main transform magnifier
(26)	Z axis magnifier

The technique of producing characters is realized by the use of a reversible counter of a pair of X and Y character coordinates to drive a D/A converter. The character storage has 63 standard characters and any stroke combinations suitable to the X, Y character coordinates system can be displayed under the control of the computer. The IBM2250 display is also equipped with a photopen.

The photopen data display is the result of successful application of CRT and photoelectric equipment in computer technology. It has greatly promoted the development of computer technology. To develop more perfect photopen data display systems, CRT with strong brightness and a high message capacity must continue to be developed. The high resolution display tube and the multicolor display tube all have one purpose, to increase the message capacity of the CRT. CRT of a high message capacity has a bright future for broad applications in modern computer technology. The need for data display CRT by the computer will be greater and greater. In the United States, the production of computers with data display CRT in 1978 was about 800,000 units. The degree of popularization of data display CRT will gradually catch up with the image reproducing tubes for television sets.

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RECOVERY TECHNIQUES OF IONIZATION ADDITIVES IN MHD GENERATION DESCRIBED

Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 3, Sep 79, pp 82-88

[Article by Lan Jixiang [5663 6060 7449], Zhu Jiazheng [2612 0502 1767], Xu Jianjun [1776 1696 6511], Zhang Xiafu [1728 7209 1381] and Dai Jinmei [2071 6855 1188] of the Research Institute of the Nanjing Chemical Industry Company: "Recovery Techniques of Ionization Additives in Magnetic Hydrodynamic Generation"]

[Text] Abstract

This article describes foreign experimental research in the technique of low temperature recovery of ionization additives in magnetic hydrodynamic generation. It introduces the process, equipment, operating conditions and the index of purification obtained in recovery of seeds (ionization additives) washed in solution of the "spray cup absorber-double aperture bubble tower-venturi tube" system mounted on the simulation machine group JS-1 of the Nanjing Engineering Academy. The article also introduces the situation of experiments on the wet electrostatic dust precipitator. At the same time, it points out the practical application of the solubility diagram in the K_2CO_3 - $KHCO_3$ - K_2SO_4 - H_2O quaternary system.

I. Foreword

In the direct conversion of heat to electricity in magnetic hydrodynamic generation, realization of thermal ionization at a temperature which specific materials can bear and which can be reached by the heater requires the addition of alkaline metallic elements of low ionization potentials such as cesium and potassium (called "seeds" or ionization additives), thus giving the burning gas sufficient electrical conductance. Ordinarily, alkaline metallic salts are used as additives. The amount of alkaline metallic elements added is about 1 percent of the weight of the electrically conducting burning gas.[1]

In the joint circulation of magnetic hydrodynamic-steam power, when potassium carbonate (K_2CO_3) is used as an additive and injected into the burning chamber at 2500°C as a solution, K_2CO_3 gasifies, decomposes and ionizes to produce potassium ions (K^+). They pass through the channels of electricity generation into the steam generator. As the temperature continues to drop, K_2CO_3 is formed step by step. At 1300°K to 1500°K, it begins to condense and forms highly scattered K_2CO_3 particles. The average diameter of the particles is 0.1 to 0.2 μ.[2] When sulphur containing fuel is used, the fuel is desulfurized and K_2SO_4 is formed. These particles produce a definite condensation in the steam generator and partially settle on the heat exchange surface. Smoke enters the recovery system before it enters the atmosphere so that the restored ionization additives and K_2SO_4 produced by chemical reaction in the smoke are recovered.

The recovery rate of the additives must satisfy the demands of economic guidelines and environmental health guidelines at the same time. Because the demands of economic guidelines are higher than the environmental health guidelines, the allowable loss by exhaust should be determined by the electrical generation equipment and technology. If the allowable loss of potassium additive is equivalent to 1 percent of the loss of fuel or equivalent to a reduction of electrical generation by 0.5 percent, generally the total recovery rate should reach above 99 percent.[2] When using cesium additive, the loss should be even lower. The joint magnetic hydrodynamic-steam power station must recover the additives very efficiently and must regenerate them for recycling so that the operation of the power station can be maintained at a highly economical level and at a low level of pollution.

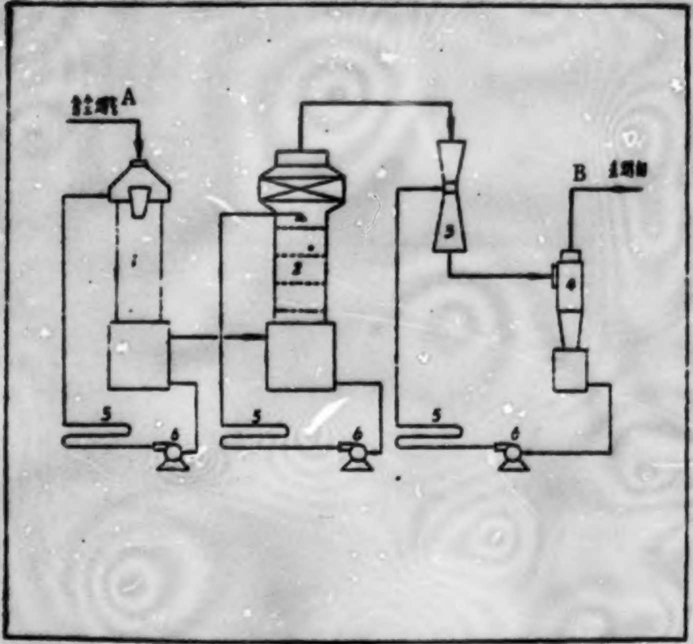
II. General Description of Research Abroad

Because the additives in smoke are submicroscopic condensed powdery dust and because of some special demands of magnetic hydrodynamic generation, the recovery of additives has become an important research topic. In the research of magnetic hydrodynamic power generation abroad, many studies have been conducted in the three possible recovery methods using gas filtration, washing by solution and by the electrostatic precipitator.[2,3,4] The High Temperature Research Institute of the Soviet Academy of Sciences completed construction of the y-02 simulation equipment with a flow of 1 kilogram/second in 1967. A fiber filter of filter area of 112 meters^2 composed of 4 filtering units was built. Detailed experiments on operating conditions and filter media were conducted. When the specific load is 0.7 to 1.0 $\text{meters}^3/\text{meter}^2 \cdot \text{minute}$, and the degree of vacuum of the system is maintained at 50 $\text{kilonewtons/meter}^2$, the dust content at the exit can reach 1 milligram/meter^3. Dust recovery operation must be conducted under a high resistance drop and a higher exhaust temperature ($> 200°C$). The y-02 equipment also has a bubble tower with two layers of sieves and a so-called "turbulent flow washer" composed of venturi tubes. They form an ionization additives extraction system. The speed in the venturi tube is 60 to 160 meters/second. When the dust content at the entrance is 5 grams/meter^3, and the resistance drop is 15 $\text{kilonewtons/meter}^2$, the dust content at the exit is 0.2 gram/meter^3. When the resistance drop increases to 20 $\text{kilonewtons/meter}^2$, the dust content at the exit can reach 0.1 gram/meter^3. The experiments also showed that the degree of conversion of K_2CO_3 in the extracted liquid to $KHCO_3$ varies with the concentration of the solution. The research achievements of the "turbulent flow washer" on the y-02 has already been used for enlarged design. An ionization additives recovery system composed of a bubble tower, variable rectangular section venturi tube and the round section venturi tube began operation on the y-25 equipment for the industrial magnetic hydrodynamic power generation experiment in 1971 (flow of

50 kilograms/second). The Soviet High Temperature Research Institute conducted a wet electrostatic dust precipitation experiment on the y-02 equipment after conducting gas filtration and solution washing experiments. The length of the electrodes of the wet board type electrostatic dust precipitator was 0.8 meter, the flow was 200 grams/second, the flow velocity was 0.5 to 0.7 meter/second, the operating voltage was 50 kilovolts, the recovery rate reached 93 percent. According to reports, the y-25 equipment is also being designed for equipping it with an electrostatic dust precipitator. England, in her early research on magnetic hydrodynamic power generation, conducted experiments on the dry single tube electrostatic dust precipitator at the Central Electrical Appliances Test Laboratory using K_2SO_4 as the additive. Japan's Electronics Technology General Research Institute developed the magnetic hydrodynamic-thermal power generation system for long periods of experiments—the No 6 generator. A dry electrostatic dust precipitator was installed in front of the exhaust and a very high efficiency was achieved.

III. Experimental Research and Results

Experimental research[5,6] on the recovery of ionization additives in power generation by the wet electrostatic dust precipitator and solution washing was conducted on the JS-1 generator group of the simulation experiment of magnetic hydrodynamic power generation at the Nanjing Engineering Academy. The flow chart of the solution washing experiment using the spray cup absorber-double aperture bubble tower-venturi tube system with the venturi tube as the centerpiece is shown in Figure 1.



Key:

A	Dust containing smoke
B	Exhaust smoke stack
1.	Spray cub absorber
2.	Double aperture bubble tower
3.	Venturi tube
4.	Whirlpool bubble remover
5.	Heat transformer
6.	Pump

Figure 1. Flow chart of retrieval experiment of the solution washing method

Smoke containing potassium carbonate forms an overflowing liquid film from the circulating liquid on the wall of the spray cup. At the bottom of the cup smoke gushes out at a velocity of 25 meters/second, causing the liquid film to atomize and enter the absorption zone. Then through a separation zone, it enters bubble tower 2 composed of double aperture sieve boards in structure from the bottom. At the top, the first sieve board is a single aperture sieve board which serves to distribute the liquid. The last three sieve boards are double aperture sieves. The designed speed of flow in the tower is 1.8 meters/second, and the speed through the aperture is 9 to 10 meters/second. The gas and the liquid manifest throughflow and complex flow movements on the sieve boards, realizing full contact between the gas and the liquid. At the top of the bubble tower is a bubble removal layer that fills the magnetic ring. After removing the bubbles, the smoke enters the contraction section of the venturi tube from the top. When it passes through the tube at a high speed of 60 to 120 meters/second, the alkaline solution being sprayed into the tube from all sides fully atomizes, making the dust particles wet and the dust particles condense fully in the dispersion tube. After the gas and the liquid are separated in the whirlpool separator 4, smoke that is highly purified is exhausted from the smoke stack. The solution in the three installations are circulated by pump 6. Changing the amount of cooling water in the heat exchanger 5 can control the temperature of the circulating alkaline solution. The alkaline solution circulation trough of each equipment has an alkaline tolerant coat of cyclic oxyfuran.

The solution washing recovery experiment was conducted in two ways: (1) The experiment was conducted along with the long period experiment of power generation by the power generator group. At this time, water is used to cool the channels and the smoke is sent into the recovery system. (2) The experiment was conducted by simulating the gas distribution under smoke exhaust conditions in actual power plants. At this time, the hot air of the heat storage furnace is not used for burning, but the burning temperature must be kept at or above 1600°C so that the liquid additive can fully gasify. Under given operating conditions, after the system is running stably, a sample is taken at each point every half hour. The samples of dust contained in [illegible] smoke are taken by a jet sampling gun and measured by a flame brightness meter [illegible] This method avoids precipitation of dust particles on the sampling tube [illegible] determine the total amount of potassium. Partial experimental data are listed in Table 1 and Table 2.

It can be seen from Table 1 and Table 2 that as the resistance loss of the system rises, the recovery rate visibly increases. When the resistance loss of the venturi tube reaches or surpasses the designated value (850 millimeters of water) a very low content of dust in the exhausted smoke can be obtained. The venturi tube is very effective in condensing and collecting fine powdery dust. The experiment shows that the following major operational parametric values should be realized:

	Velocity of gas meter/second	Liquid and gas ratio meter^3/1000 meter^3
Spray cup absorber	25	4
Double aperture bubble tower	1.5 - 1.8	3 - 4
Venturi tube	$\geqslant$ 96	0.9 - 1.1

Table 1. Table of Data of Retrieval of Additives in Systematic Power Generation

(1) 烟气温度 ℃				(2) 系统阻力 毫米水柱	(3) 烟气含尘 克K^+/米^3		(4) 碱液浓度 %			(5) 净化度 %
(6) 进入烟气	(7) 喷杯后	(8) 泡沫塔后	(9) 排烟		(10) 进入烟气	(11) 排烟	(12) 喷杯	(13) 泡沫塔	(14) 文氏管	
370	125	62	60	542	9.2	0.64	—	—	—	93.1
525	145	71	69	570	7.3	0.94	—	—	—	87.0
350	135	80	77	775	12.0	0.30	—	—	—	96.4
380	137	—	80	815	9.85	0.106	—	—	—	98.9
450	137	85	82	884	7.8	0.17	—	—	—	97.8
450	137	85	82	924	6.58	<0.04	—	—	—	98.4
345	136	89	86	1100	9.96	0.151	11.6	14.2	22.2	97.6
330	130	90	87	1150	9.28	0.155	22.4	7.2	8.1	98.4
400	>150	90	86.5	1280	9.04	0.193	13.8	5.0	7.5	98.0
—	136	84	81	1310	12.0	0.45	31.2	12.5	11.6	96.4
—	139	94	89	1900	11.1	0.093	11.0	13.2	28.3	99.2

Key:

(1) Temperature of smoke °C
(2) System resistance millimeter water column
(3) Dust content in smoke gram K^+/meter^3
(4) Concentration of alkaline solution (percent)
(5) Degree of purification (percent)
(6) Entering smoke
(7) After spray cup
(8) After bubble tower
(9) Exhausted smoke
(10) Entering smoke
(11) Exhausted smoke
(12) Spray cup
(13) Bubble tower
(14) Venturi tube

It is believed that under specified operating conditions, recovery of the ionization additives in smoke--potassium carbonate--by washing with seeded solution using the "spray--bubble--venturi" system in magnetic hydrodynamic power generation can satisfy economic demands and smoke exhaust standards. The recovery rate can reach over 99 percent. The content of potassium carbonate in the exhausted smoke is under 0.2 gram/meter^3.

When using potassium salt additives, the recovered substance contains such salts as potassium carbonate, potassium hydrocarbonate, and potassium sulfate. When using the wet recovery method, three kinds of solutions are obtained, forming a quaternary system[7] of K_2CO_3 - $KHCO_3$ - K_2SO_4 - H_2O. Drawing and using the isotherm solubility diagram of the quaternary system K_2CO_3 - $KHCO_3$ - K_2SO_4 - H_2O have a practical guiding significance for the composition of solutions of the wet recovery method and selection of concentration. The basic requirement is to avoid the production of crystals in the recovery operation. Seen from the phase figure 2, there are two aspects: (1) The proportional relationship among the three salts is at the point of the triangle on the bottom surface. The proportional relationship between potassium hydrocarbonate is mainly determined

Table 2. Table of Data of Retrieval of Additives in Simulated Steam Supply Experiment

(1) 烟气量 HM^3/h	(2) 温度 °C		(3) 阻力降 毫米水柱		(4) 碱液循环量 M^3/h			(5) 烟气含尘克K^+/M^3			(6) 净化度 %
	(7) 进气	(8) 排烟	(9) 系统	(10) 文氏管	(11) 喷杯	(12) 泡沫塔	(13) 文氏管	(14) 进气	(15) 泡沫塔后	(16) 排烟	
2010	370	45	422	252	—	6	2	5.08	—	0.365	92.6
2010	360	44	435	266	~20	6.7	2.3	5.55	—	0.33	93.7
2010	380	45	694	432	20	11.3	2.8	4.6	3.29	0.21	95.2
2910	390	40	1275	942	20	10.1	2.1	2.82	1.44	0.025	99.0
2930	460	44	1455	1035	9	10	3	2.04	—	0.04	98.7
2930	330	41	1530	1154	9.3	10.2	3.3	2.64	—	0.017	99.2
3000	300	44	1265	977	20	10.1	2.5	2.33	1.27	0.067	97.2
3080	324	49	1440	970	20	10.8	2.5	2.62	0.855	0.04	98.5
3000	280	54	3290	962	20	10.2	2.6	3.59	0.576	0.04	98.7
3000	340	56	1290	1044	20	—	2.6	2.07	—	0.019	99
3000	320	58	1418	1140	20	—	2.6	2.35	—	0.019	99

Key:

(1)	Amount of smoke	(7)	Entering steam
(2)	Temperature °C	(8)	Exhausting smoke
(3)	Resistance drop, millimeter of water column	(9)	System
(4)	Amount of circulation of alkaline solution M^3/h	(10)	Venturi tube
(5)	Dust content in smoke K^+/M^3	(11)	Spray cup
(6)	Degree of purification (percent)	(12)	Bubble tower
		(13)	Venturi tube
		(14)	Entering steam
		(15)	After bubble tower
		(16)	Exhausting smoke

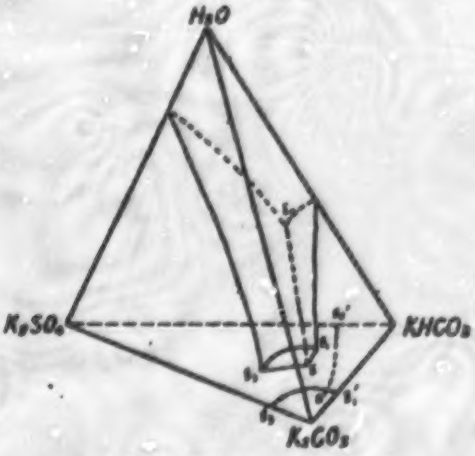


Figure 2. $K_2CO_3 - KHCO_3 - K_2SO_4 - H_2O$
Diagram of isotherm solubility of the quaternary system

by the partial pressure of carbon dioxide in the smoke while the content of potassium sulfate must be selected. If this content is chosen too high, the point of the graph of the solution composed of this dissolved substance will easily touch the surface of the giant crystal of potassium sulfate. If it is chosen too low, the amount of the solution extracted for regeneration operations will increase. (2) The content of water in the solution when the relative contents of the three types of salts are selected is still a free amount. This variable in the phase diagram determines the spatial height of the point of the diagram. If it is chosen too low, it will similarly yield crystals. If it is chosen too high, the content of water will be too large and the amount of heat consumed is recycling and use will increase. The point of the diagram of the solution in recovery operations in principle should approach point E, but must not touch each saturation surface. The actual composition of the solution and concentration should be determined by experiment and with reference to the phase diagram drawn.

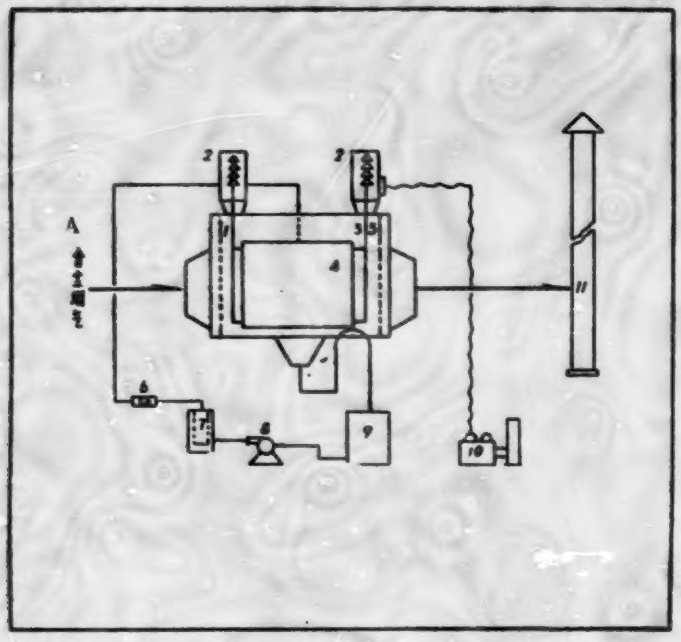


Figure 3. Experimental installation of the wet wall type precipitator

Key: A Dust containing smoke
(1) Gas distribution board
(2) Handling box
(3) Electrical corona frame
(4) Precipitation pole
(5) Static separation board
(6) Flow meter
(7) Filter
(8) Pump
(9) Circulation trough
(10) High voltage rectifier power source
(11) Smoke stack

The flow chart of the wet electrostatic dust precipitator experiment is shown in Figure 3. The reason for using the wet method for recovering dust electrostatically is the consideration that the powdery dust of potassium carbonate is fine and its specific electrical resistance is relatively high (actually measured at 4.7×10^{10} ohms·centimeter), suitable for the conditions of electrostatic recovery of dust. The effective sectional area of a small scale wet electrostatic dust precipitator is 0.64 meters^2. The flat board's precipitation pole is 3 meters long. The distance between the boards is 250 millimeters. There are two sets of atomizing and spraying spout in front of the electrical field. There are also atomizing and spraying spouts or wall-washing spraying tubes lengthwise. In front of the electrical field is an air flow distributing plate. In the back is a double layer electrostatic separation board. A spiked corona wire and a manually operated electron tube rectifier power source are used. The experiment can be conducted jointly with the boiler's experimental support and can also be connected to the power generator group for joint operation. The content of K^+ in the sample solution can be measured by the flame brightness method. Records of the test runs of the wall-washed electrostatic dust precipitator are shown in Table 3. The supply voltage is 47 to 57 KV, when the velocity of air flow is between 0.6 and 0.7 meter/second, the dust recovery efficiency is above 90 percent, reaching a highest of 98 percent. The lowest exit dust content is below 200 milligrams/meter^3, generally between 200 and 500 milligrams/meter^3. When the air flow surpasses 0.7 meter/second, the exit dust content will increase.[7,8]

Table 3. Record of Test Run of the Washed Wall Electrostatic Precipitator

序 (1) 号	(2) 气量 米^3/时	(3) 气速 米/秒	(4) 进气温度 ℃	(5) 操作电压 KV	(6) 工作电流 mA	(7) 火焰光度计测定		
						进(8)口 K_2CO_3 克/米^3	出(9)口 K_2CO_3 克/米^3	η %
1	1450	0.64	76	57	7.5	8.55	0.178	97.92
2	1600	0.70	82	57	7.0	9.26	0.285	96.92
3	1700	0.74	83	54	6.0	9.61	0.214	97.77
4	1750	0.76	83	49	5.5	7.09	0.570	92.00
5	1950	0.85	86	51	6.0	7.78	0.570	92.70
6	2050	0.895	86	51	6.0	7.48	0.534	92.84
7	1500	0.65	80	51	5.5	1.64	0.214	87.00
8	1900	0.625	81	57	6.5	9.43	0.570	93.96
9	2100	0.915	84	54	6.0	9.61	0.785	91.86
10	2300	1.00	84	54	6.0	9.61	0.855	91.10
11	1750	0.76	82	53	6.0	9.15	0.570	93.76
12	—	—	—	--	—	9.94	0.570	94.26
13	1800	0.715	83	50	7.5	9.45	0.712	92.62
14	--	—	—	—	—	11.45	0.605	94.68

Key:

(1) Numerical order
(2) Amount of steam meter^3/hour
(3) Velocity of steam meter/second
(4) Temperature of entering steam °C
(5) Operating voltage KV
(6) Operating current mA
(7) Flame brightness meter measurements
(8) At entry K_2CO_3 gram/meter^3
(9) Exit K_2CO_3 gram/meter^3

The structure of the wet electrostatic dust precipitator is simple. Using a small amount of solution can achieve good polar plate washing results. The partial electrostatic plate can help increase the efficiency. The entire polar plate is resistant to erosion and is durable. Further improvement of the structure of the installation (adding a separation plate to prevent shortage, improving the quality of installation of the electrodes and hanging insulation etc) and using automatically controlled power sources will further reduce the concentration of the content of exit dust of the installation.

IV Several Views

The recovery of the ionization additives in magnetic hydrodynamic power generation requires a very high efficiency. The bag type filter, the venturi tube washer and the electrical dust precipitator are three possible high performance dust precipitation installations to be used. The bag type dust eliminator can have a high efficiency but it is bulky. It requires frequent maintenance. Pressure loss is large and it is not used much in industry. The venturi tube washer has outstanding functions. Its structure is simple, operation is stable, building speed is fast, but in operation its resistance loss is still large. The electrostatic dust precipitator exerts direct force upon the suspended bodies, therefore it can operate with low resistance and high efficiency. It has become an ideal dust elimination installation. Theoretically it can collect dust particles of any size. In actual use, when collecting fine powdery dust of high electrical resistance, the efficiency of the dry electrostatic dust precipitator will drop because of such phenomena as the occurrence of reverse electrical corona and dust flying a second time. Although the wet electrostatic dust precipitator can by nature solve these shortcomings of the dry electrostatic dust precipitator, but a large amount of the recovered substance is in a dissolved state.

Worth mentioning is the recent development of the mixed-dry-wet type (hybrid type) electrostatic dust precipitator. It possesses the original advantage of having a low resistance drop of the electrostatic dust precipitator and has also effectively overcome the shortcoming of the wet electrostatic dust precipitator. In such recovery equipment, most of the powdery dust is trapped by the dry part. A small amount of fine powdery dust enters the wet recovery part. Because the phenomena of the occurrence of reverse electrical corona and dust flying a second time have been overcome, even ultrafine particles can be trapped and the concentration of the content of exiting dust can be effectively reduced. The dry powdery dust recovered by the dry part can be directly used as the solid additive seeds (ionization additives) for magnetic-hydrodynamic power generation while a small amount of solution can facilitate regeneration. Therefore, this type of dust recovery equipment has a bright future of being used in magnetic hydrodynamic power generation.

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APPLIED SCIENCES

BALANCING FLEXIBLE SHAFT GYRO ROTOR STUDIED

Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 4, Dec 79 pp 72-85

[Article by Cha Liguan [2686 4409 0385]: "The Gyroscope Vibration Research Group of the Research Laboratory of Gyroscope Principles and Application." This article was received in April 1979. Second draft completed on 25 August]

[Text] The Problem of Balancing the Flexible Shaft Gyro Rotor

Abstract

In the past 10 years, many methods for balancing the flexible shaft rotor have been proposed and used. These methods can be classified into two types, depending on whether the shaft is balanced as a rigid body. This article centers on the factors that affect the sensitivity of balance of the flexible shaft rotor. In addition, the article also suggests some ways to improve the dynamic balance of the flexible shaft gyro rotor.

I. Introduction

The gyro motor is the key element that affects the precision and life of the gyroscopic instruments. In stabilization equipment, aviation, navigation, guided missiles and man-made satellites, the gyroscopic inertia and precession of the gyroscope can be used to make various types of gyro equipment such as the azimuth compass, altazimuth, azimuth level, gyrocompass, stabilizer platform, autopilot and guidance systems. But the characteristics of the gyroscope are only manifested when the rotor rotates at high speeds and the faster the rotation the more pronounced the characteristics of the gyroscope. Therefore, the speed of rotation of ordinary gyro rotors is all above 20,000 revolutions/minute, some can rotate at 100,000 revolutions/minute. Because the rotary axis of the rotor shifts to the axis of inertia, a dynamic imbalance is produced leading to the occurrence of inertia and inertial moment, and the gyroscope drifts. For example, a gyro rotor weighing one kilogram and whose longitudinal shift of the center of gravity of the rotor is $e = 0.002$ millimeter will have an inertia F of:

$$F = \frac{G}{g} e \left(\frac{\pi n}{30}\right)^2 = \frac{1}{9.8} \times 0.002 \times 10^{-3} \times \left(\frac{\pi \times 24 \times 10^3}{30}\right)^2 = 1.29 \text{ kg}$$

The dynamic imbalance of the high speed rotor will cause the entire gyro to vibrate and will add a dynamic load, causing the gyro to undergo additional drift on the one hand and affect the precision of the gyroscope, and on the other hand, the life of the gyroscope is also affected. Improving the balance of the gyroscope serves importantly to improve the precision of the gyroscope and prolong the life of the gyroscope. At present, some factories in our nation that manufacture gyroscopes use machine balancing techniques to balance them. Some abnormal phenomena have occurred in the process of balancing when using these balancing techniques. For example, when balancing on the balancing machine, the stationary imbalance or dynamic imbalance of the rotor in the vibration system cannot be shown. Sometimes a rotor which has been balanced as required on the balancing machine manifests imbalance when the balancing speed of rotation or the bearing rigidity is changed. These problems were discussed at the Second National Academic Conference on Dynamic Balance held in Fuzhou. It was believed that theoretical analysis of the balance of rotors is necessary for finding some effective methods to improve the precision of dynamic balance of rotors. This article discusses some preliminary analysis of the balancing of flexible shaft gyro rotors.

II. Vibration Model of Dynamic Balance of the Gyro Rotor

The causes of imbalance of the gyro rotor are many, such as improper structural design of the gyro rotor, the effects of magnetic moment of the hysteresis motor, unequal elasticity of the materials, improper matching of materials with different thermal expansion coefficients, effects of damping in air, will all affect the balance of the rotor. Let us take the dynamic balance of the elastic thin walled flexible shaft rotor of the navigational compass (model 601) to study the vibration model in the process of dynamic balancing of the flexible shaft rotor. Figure 1 shows the vibration model of the flexible shaft rotor on the dynamic balancing machine. The rotor and the shaft housing form a rotary system supported on the elastic support of the dynamic balancing machine. When the rotor is stationary on the elastic support of the balancing machine, the center of mass of the rotor $0'$ coincides with the origin 0 of the fixed coordinates system $Q\xi\eta\zeta$. The $Q\eta$ axis and the axial line of the stationary gyro rotor are consistent. The positive direction and the direction of the vector of the angular velocity of the gyro rotor are consistent. When the axis of the gyro rotor undergoes flexible deformation, the center of mass of the rotor system is at $0'$. The coordinates xyz of $0'$ and the gyro are connected but they do not participate in the spinning movement of the gyro rotor. The direction of the coordinate axis $0'x$ and the direction of the tangent line at the center of the mass of the rotary shaft are consistent. The origin $0'$ of the coordinate system is determined by the position of the center of mass of the rotor when axis of the rotor undergoes flexible deformation. When the gyro rotor rotates at angular velocity ω, a forced vibration of the rotor system is caused by the unbalanced inertia due to the imbalance of the quality of the rotor. To study the relationship between the rotary angles of the dynamic coordinates system $0'xyz$ and the fixed coordinates system $O\xi\eta\xi$, we first allow the origin $0'$ of the dynamic coordinates system to coincide with the origin of the fixed coordinates system as shown in Figure 2. The angle α is the rotary angle about the $O\zeta$ axis of the dynamic coordinates $0'xyz$ and β is the rotary angle about the Oz axis of the dynamic coordinates $0'xyz$. The positive directions of the vectors $\dot{\alpha}$, $\dot{\beta}$, and ω of the angular velocity are determined by the right hand spiral method. The positive directions of $\dot{\alpha}$, $\dot{\beta}$, and ω are in the

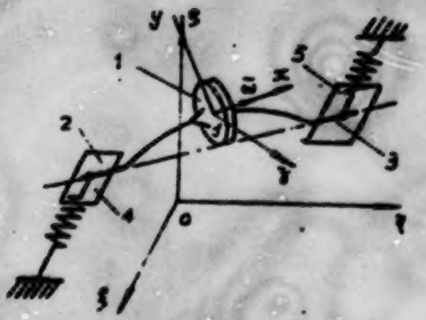

Figure 1. Simple diagram of the gyro rotor of or the 601 model compass

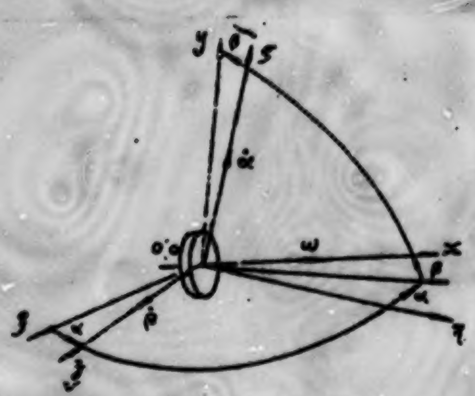

Figure 2. The relationship between the coordinates system O'xyz and Oξηζ

positive directions of the ζ, z and x axis respectively. When the center O' of mass of the rotor moves relative to the origin O of the fixed coordinates system, the position of the point O' can be determined from the coordinates of O' of the fixed coordinates system Oξηζ. When the system undergoes deformation in the vibration process, its spatial position is determined by the coordinates ξ, η, ζ and α, β which determine the spatial position of the point O'.

III. The Equation of Motion of the Gyro Rotor

To write down the systematic equations of motion, we can analyze the motion in the 0 horizontal surface and the 0 vertical surface. First we find the dynamic energy and potential energy of the system. Then we use Lagrange's equations of the second kind to set up the equations of motion for the small vibrations of the system. First we use the projections of $\dot{\alpha}$, $\dot{\beta}$ and ω to calculate the projected values Ωx, Ωy and Ωz of the angular velocity of the rotor on the x,y z axis.

$$\left.\begin{aligned} \Omega_x &= \omega + \dot{\alpha} \sin \beta \\ \Omega_y &= \dot{\alpha} \cos \beta \\ \Omega_z &= \dot{\beta} \end{aligned}\right\} \qquad (1)$$

Angle β is very small and we can regard sin β≈β, cos β≈1. The angle θ is the rotary angle of the axial line of the motor housing and the shaft covering components about the vertical axis on the horizontal surface. The angle θ and the angle α are in the same direction. The motor housing and the shaft covering components can be viewed as elements that do not undergo elastic deformation. The difference between α and θ is very small. Because the elasticity of the vibration support is far greater than the elasticity of the shaft of the rotor, this high value small difference can be neglected, i.e., α ≈ θ.

Equation (1) can be written as:

$$\left.\begin{aligned} \Omega_x &= \omega + \dot{\theta}\beta \\ \Omega_y &= \dot{\theta} \\ \Omega_z &= \dot{\beta} \end{aligned}\right\} \qquad (2)$$

Now let us analyze and study the balancing of the gyro motor of the 601 model compass on the A-21 model dynamic balancing machine. If the degree of freedom of the housing components along the axial direction of the rotor is not counted (because the axial rigidity of the rotor is far greater than the horizontal rigidity of the spring), the motor housing and the shaft covering components have two dimensions of freedom of movement in space. The corresponding general coordinates are θ and ξ. Let us set up the equations of motion of small vibrations of the system in the following.

1. Dynamic energy of the system

(1) Dynamic energy of the gyro rotor: The dynamic energy of the gyro rotor consists of horizontal kinetic energy T_1 of the center of mass of the gyro rotor and the rotary kinetic energy T_2 of the center of mass of the gyro rotor.

$$T_1 = \frac{1}{2} M_1 \ (\dot{\xi}^2 + \dot{\zeta}^2)$$

M is the mass of the gyro rotor.

$\dot{\xi}$, $\dot{\zeta}$ are the projections of the velocity of the center of mass of the gyro rotor on the ξ and ζ axis.

$$T_2 = \frac{1}{2} I_0 \Omega_x^2 + \frac{1}{2} I (\Omega_y^2 + \Omega_z^2)$$

$$= \frac{1}{2} I_0 \omega^2 + I_0 \omega \dot{\theta} \beta + \frac{1}{2} I (\dot{\theta}^2 + \dot{\beta}^2)$$

I_0, I are respectively the inertia of the polar rotation of the gyro rotor and the inertia of the equatorial rotation.

(2) The kinetic energy T_3 of the gyro motor housing and the housing components: The spatial position of the gyro motor housing and the housing components is determined by the general coordinates ξ and ζ. Their movement consists of horizontal movement in the ξ direction and the rotation about the vertical axis (θ is the angle of rotation).

$$T_3 = \frac{1}{2} M_3 \dot{\xi}^2 + \frac{1}{2} I_3 \dot{\theta}^2$$

M_2, I_2 are respectively the mass of the gyro motor housing and the housing components and the equatorial inertia.

(3) Kinetic energy T_4 of the vibrating supports: First we find the velocities of horizontal movements of the two left and right vibrating supports $\dot{\xi}_{left}$ and $\dot{\xi}_{right}$.

$$\dot{\xi}_{left} = \dot{\xi} + \dot{\theta} l_{left} \qquad \dot{\xi}_{right} = \dot{\xi} - \dot{\theta} l_{right}$$

l_{left} and l_{right} respectively represent the distances between the center of mass of the rotor and the left and right vibrating supports

$$T_4 = \frac{1}{2} M_3 (\dot{\xi} + \dot{\theta} l_{left})^2 + \frac{1}{2} M_3 (\dot{\xi} - \dot{\theta} l_{right})^2$$

$$= M_3 \dot{\xi}^2 + M_3 \dot{\theta}\dot{\xi} (l_{left} - l_{right}) + \frac{1}{2} M_3 \dot{\theta}^2 (l_{left}^2 + l_{right}^2)$$

M_3 is the mass of each vibrating support.

The total kinetic energy T of the system is:

$$\begin{aligned} T &= T_1 + T_2 + T_3 + T_4 \\ &= \frac{1}{2} M_1 (\dot{\xi}^2 + \dot{\zeta}^2) + \frac{1}{2} I_0 \omega^2 + I_0 \omega \dot{\theta} \beta \\ &\quad + \frac{1}{2} I (\dot{\theta}^2 + \dot{\beta}^2) + \frac{1}{2} M_2 \dot{\xi}^2 + \frac{1}{2} I_2 \dot{\theta}^2 + M_3 \dot{\xi}^2 \\ &\quad + M_3 \dot{\theta}\dot{\xi} (l_{\text{左}} - l_{\text{右}}) + \frac{1}{2} M_3 \dot{\theta}^2 (l_{\text{左}}^2 + l_{\text{右}}^2) \end{aligned} \tag{3}$$

2. Potential energy of the system in spatial motion

When the system is in spatial motion, the shaft of the gyro rotor is subject to the inertia P_ζ and the inertia moment M_ξ (as shown in Figure 3). The elastic deformation on the horizontal surface is very small and can be neglected. Thus, the potential energy Π of the system consists of the potential energy Π_1 of the elastic force of the restoration of the spring of the vibrating support, the potential energy Π_{P_ζ} of the system caused by the inertia P_ζ on the rotor and potential energy Π_{M_ξ} of the system caused by the inertia moment M_ξ on the rotor.

(1) Potential energy Π_1 of the force of restoration of the spring of the vibrating support.

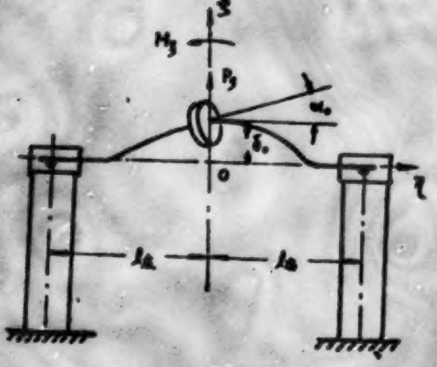

Figure 3. Illustration of the positional shift of the rotor's axis under the inertia and the inertia moment forces

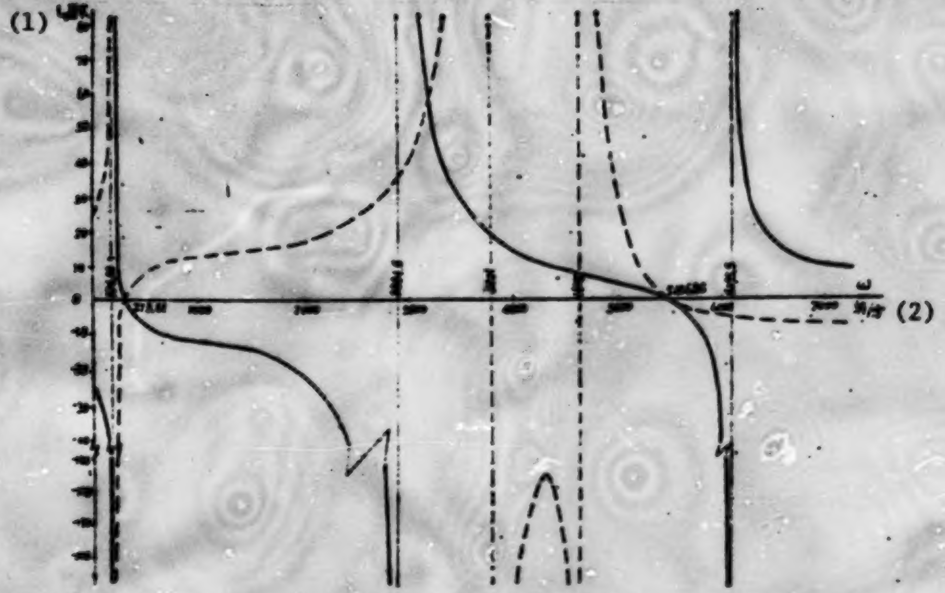

Figure 4. Relationship between the balanced speed of rotation and the vibration center distance Lv

Key: (1) centimeter
(2) revolutions/minute

solid line -- the unbalanced amount is in the right balance plane
dotted line-- the unbalanced amount is in the left balance plane

$$\begin{aligned}\Pi_1 &= \frac{1}{2}k(\xi + \theta l_{\text{left}})^2 + \frac{1}{2}k(\xi - \theta l_{\text{right}})^2 \\ &= k\xi^2 + k\xi\theta(l_{\text{left}} - l_{\text{right}}) + \frac{1}{2}k\theta^2(l_{\text{left}}^2 + l_{\text{right}}^2)\end{aligned} \qquad (4)$$

k is the elastic coefficient of the spring.

(2) The elastic change in position δ_0 and the rotary angle α_0 caused by the effects of the inertia moment M_ξ and the inertia P_ζ on the axis of the rotor under elastic deformation potential energy $\Pi_{P\zeta}$ and $\Pi_{M\xi}$ of the axis of the gyro rotor can be determined by the following equations:

$$\left.\begin{aligned}\delta_0 &= a_{11}P_\zeta + a_{12}M_\xi \\ \alpha_0 &= a_{21}P_\zeta + a_{22}M_\xi\end{aligned}\right\} \qquad (5)$$

where α_{11}, α_{12} represent the changes in position of the axis of the rotor from the location of the center of mass of the rotor caused respectively by the unit force and the unit moment at the center of mass of the gyro rotor, and α_{21}, α_{22} represent the rotary angles at the center of mass of the gyro rotor caused by the respective unit force and unit moment on the axis of the rotor.

Figure 5 shows the changes in position at the center of mass of the gyro rotor under the effects of inertia P_ζ and inertia moment M_ξ. The relationship between α_{11}, α_{12}, α_{21}, α_{22} and inertia P_ζ and inertia moment M_ξ can be solved.

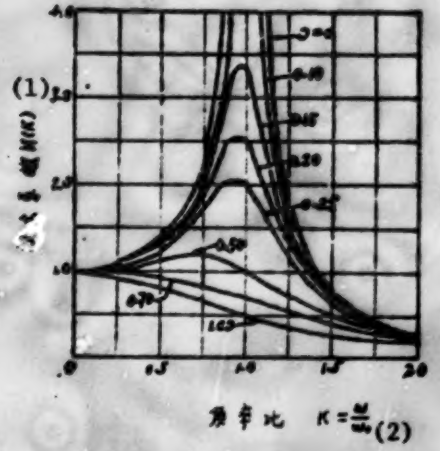

Figure 5. Characteristic curve of amplitude and frequency

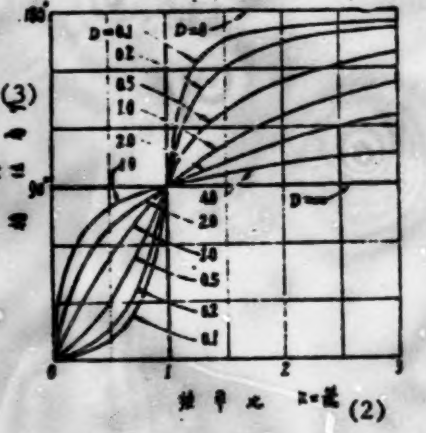

Figure 6. Characteristic curve of phase and frequency

Key:
(1) Magnificent coefficient
(2) Frequency ratio
(3) Phase angle φ

Solving equation (5) we have:

$$\begin{aligned} P_\zeta &= \frac{\alpha_{22}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}}\delta_0 \\ &- \frac{\alpha_{12}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}}\alpha_0 \\ &= C_{11}\delta_0 - C_{12}\alpha_0 \\ M_\xi &= \frac{\alpha_{11}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}}\alpha_0 \\ &- \frac{\alpha_{21}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}}\delta_0 = C_{22}\alpha_0 - C_{21}\delta_0 \\ C_{11} &= \frac{\alpha_{22}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}} \qquad C_{12} = \frac{\alpha_{12}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}} \\ C_{21} &= \frac{\alpha_{21}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}} \qquad C_{22} = \frac{\alpha_{11}}{\alpha_{11}\alpha_{22}-\alpha_{21}\alpha_{12}} \end{aligned} \tag{6}$$

By the commutative law, $\alpha_{12} = \alpha_{21}$, thus $C_{12} = C_{21}$. Also, we know from Figure 2 and Figure 3, $\alpha_0 \approx P$, $\delta_0 \approx \zeta_0$. Thus the deformation potential energy $\Pi_{P\zeta}$ and $\Pi_{M\xi}$ under the inertia P_ζ and inertia moment M_ξ can be calculated:

$$\Pi_{P\zeta} = \frac{1}{2} P\zeta \cdot \zeta = \frac{1}{2} C_{11}\zeta^2 - \frac{1}{2} C_{12}\zeta\beta$$

$$\Pi_{M\xi} = \frac{1}{2} M_\xi \cdot \beta = \frac{1}{2} C_{22}\beta^2 - \frac{1}{2} C_{12}\zeta\beta$$

The potential energy of the entire system is:

$$\begin{aligned} \Pi = \Pi_1 + \Pi_{P\zeta} + \Pi_{M\xi} &= k\xi^2 + k\xi\theta(l_{left} - l_{right}) \\ &+ \frac{1}{2} k\theta^2 (l_{left}^2 + l_{right}^2) + \frac{1}{2} C_{11}\zeta^2 + \frac{1}{2} C_{22}\beta^2 - C_{12}\beta\zeta \end{aligned} \tag{7}$$

The unbalanced mass of the rotating part of the gyro motor is m_1, the radial distance r is deviation of the axial line from the center of mass of the rotor, when the gyro rotor rotates at an angular velocity of ω, the centrifugal inertia acting upon the center of mass of the rotor is $F_{LI} = m_1 r\omega^2$.

Simplifying this force to the origin of the coordinates yields two forces and two double moments of force as follows:

$$
\begin{aligned}
F_\zeta &= m_1 r\omega^2 \cos(\omega t + \varphi)\\
F_\xi &= m_1 r\omega^2 \sin(\omega t + \varphi)\\
M_\zeta &= m_1 r\omega^2 h \sin(\omega t + \varphi)\\
M_\xi &= m_1 r\omega^2 h \cos(\omega t + \varphi)
\end{aligned}
$$

F_ζ, F_ξ are the forces acting along the ζ or ξ axial direction at the origin of the coordinates.

M_ζ, M_ξ are the moments about the ζ or ξ axis, h is the distance of deviation along the ξ axis of the center of mass of the gyro rotor.

Now we apply the Lagrangian equation

$$
\frac{d}{dt}\left(\frac{\partial L}{\partial \dot q_i}\right) - \frac{\partial L}{\partial q_i} = Q_i
$$

$$
L = T - \Pi \qquad i = 1,\ 2\cdots\cdots
$$

and substitute the values into the above equation, we obtain the group of differential equations of forced vibration:

$$
\left.
\begin{aligned}
&(M_1 + M_2 + 2M_3)\ddot\xi + 2k\xi + M_3\ddot\theta(\overset{*}{l}_{左} - \overset{**}{l}_{右}) + k\theta(\overset{*}{l}_{左} - \overset{**}{l}_{右})\\
&\quad = m_1 r\omega^2 \sin(\omega t + \varphi_1)\\
&M_1\ddot\zeta + C_{11}\zeta - C_{12}\beta = m_1 r\omega^2 \cos(\omega t + \varphi_1)\\
&[I + I_2 + M_3(\overset{*}{l}_{左}{}^2 + \overset{**}{l}_{右}{}^2)]\ddot\theta + I_0\omega\dot\beta + k\theta(\overset{*}{l}_{左}{}^2 + \overset{**}{l}_{右}{}^2)\\
&\quad + M_3\ddot\xi(\overset{*}{l}_{左} - \overset{**}{l}_{右}) + k\xi(\overset{*}{l}_{左} - \overset{**}{l}_{右}) = -m_1 r\omega^2 \sin(\omega t + \varphi_1)\\
&I\ddot\beta - I_0\omega\dot\theta - C_{12}\zeta + C_{22}\beta = m_1 r\omega^2 h\cos(\omega t + \varphi_1)
\end{aligned}
\right\} \quad (8)
$$

[* = left ** = right]

On the dynamic balancing machine, $l_{left} = l_{right} = l$. The above equations are simplified to:

$$
\left.
\begin{aligned}
&(M_1 + M_2 + 2M_3)\xi + 2k\xi = m_1 r\omega^2 \sin(\omega t + \varphi_1)\\
&M_1\ddot\zeta + C_{11}\zeta - C_{12}\beta = m_1 r\omega^2 \cos(\omega t + \varphi_1)\\
&(I + I_2 + 2M_3 l^2)\ddot\theta + I_0\omega\dot\beta + 2kl^2\theta = -m_1 r\omega^2 h\sin(\omega t + \varphi_1)\\
&I\ddot\beta - I_0\omega\dot\beta - C_{12}\zeta + C_{22}\beta = m_1 r\omega^2 h\cos(\omega t + \varphi_1)
\end{aligned}
\right\} \quad (9)
$$

IV. Center of Vibration and Distance of the Center of Vibration

When the gyro rotor is balanced on the balancing machine, its equations of motion are as shown in equations (9). The terms ζ and ξ are the shifts of horizontal movement and θ and β are the angular shifts of rotary motion, ω is the speed of rotation of the gyro rotor during the process of balancing and is the balanced rotary speed. The entire rotor system--including the gyro rotor, motor housing, housing components--is supported on the vibration measuring support. The support transmits the small vibrations to the transducer and the transducer transmits the signals to the display equipment.

Now we solve equations (9). Let the special solution of equations (9) be:

$$\left.\begin{array}{ll} \xi=a_1\sin(\omega t+\varphi_1) & \zeta=a_2\cos(\omega t+\varphi_1) \\ \theta=a_3\sin(\omega t+\varphi_1) & \beta=a_4\cos(\omega t+\varphi_1) \end{array}\right\} \qquad (10)$$

Differentiating equations (10) and substituting the results of differentiation and equations (19) simultaneously into equations (9) and after arranging the terms we obtain the following equations:

$$\left.\begin{array}{l} [2k-(M_1+M_2+2M_3)\omega^2]a_1=m_1r\omega^2 \\ (C_{11}-M_1\omega^2)a_2-C_{12}a_4=m_1r\omega^2 \\ [2kl^2-(J+J_1+2M_3l^2)\omega^2]a_3-I_0\omega^2a_4=-m_1r\omega^2h \\ (C_{22}-I\omega^2)a_4-I_0\omega^2a_3-C_{12}a_2=m_1r\omega^2h \end{array}\right\} \qquad (11)$$

From equations (11) we can solve a_1 and a_3:

$$\left.\begin{array}{l} a_1=\dfrac{m_1r\omega^2}{2k-(M_1+M_2+2M_3)\omega^2} \\ a_3=\dfrac{\Delta_\theta}{\Delta}m_1r\omega^2 \end{array}\right\} \qquad (12)$$

where

$$\Delta=\begin{vmatrix} C_{11}-M_1\omega^2 & 0 & -C_{12} \\ 0 & 2kl^2-(J+J_1+2M_3l^2)\omega^2 & -I_0\omega^2 \\ -C_{12} & -I_0\omega^2 & C_{22}-I\omega^2 \end{vmatrix}$$

$$\Delta\theta=\begin{vmatrix} C_{11}-M_1\omega^2 & 1 & -C_{12} \\ 0 & -h & -I_0\omega^2 \\ -C_{12} & h & C_{22}-I\omega^2 \end{vmatrix}$$

The movement of the axial line of the motor and the housing group is composed of the two parts of horizontal movement and rotary movement. The movement of the entire gyro rotor, motor housing and housing group is about a certain point. Such a point is called the system's vibration center. The distance from the center of mass of the gyro rotor to the vibration center can be called the vibration center distance, designated L_v.

$$L_v = \frac{\xi}{\theta} = \frac{a_1}{a_3} = \frac{\Delta}{[2k - (M_1 + M_2 + 2M_3)\omega^2]\,\Delta_\theta} \tag{13}$$

V. Static Loss of Vibration and Dynamic Loss of Vibration

The periodic movement of the left and right supports of the balancing machine is related to the vibration center distance L_v. Now we discuss two special situations:

1. $L_v \to \infty$

When $\Delta \neq 0$, but $2k-(M_1+M_2+2M_3)\omega^2=0$ 时, $L_v \to \infty$.

At this time, the value of angular shift shows the angular vibration component is $\theta = \frac{\xi}{L_v} = 0_0$. This means that regardless of whether a dynamic movement that causes the gyro to undergo angular vibration exists on the gyro rotor, no values of angular shift are shown on the balancing machine. The two vibration supports vibrate at the same amplitude and in the same phase. This is the same as the situation of stationary imbalance. When $L_v \to \infty$ the angular vibration component of the system disappears. Even when there is a dynamic imbalance on the gyro rotor, the balancing machine cannot measure the value of imbalance at this time. We call this phenomenon a dynamic loss of vibration. We know from equations (13) that when $\Delta = 0$:

$$\Delta_\theta = 0 \text{ or}$$

We call the balanced rotary speed ω at this time the rotary velocity of dynamic loss of vibration or rotary velocity of linear vibration. The ω linear vibration can be computed as follows:

When $2k-(M_1+M_2+2M_3)\omega_{线}^2=0$

$$\omega_{线}^2 = \frac{2k}{M_1+M_2+2M_3} \tag{14}$$

When $\Delta_\theta=0$

$$-hM_1(I+I_0)\omega_{线}^4 + \{I_0C_{12} + h[C_{11}(I+I_0) + C_{22}M_1]\}\omega_{线}^2 + h(C_{12}^2 - C_{11}C_{22}) = 0 \tag{15}$$

2. $L_v = 0$

When $\Delta_\theta \neq 0$, $\Delta = 0$, $L_v = 0$. We know from equations (10) and equations (13) that when $\Delta = 0$, $a_1 = 0$, $\xi = 0$. The left and right vibrating supports of the balancing machine undergo angular vibrations of equal amplitudes and reverse phases. The horizontal vibration component has disappeared. This is the same as the situation when only dynamic imbalance exists. Regardless of whether stationary imbalance exists on the gyro rotor, when $L_v = 0$, the balancing machine cannot measure the value of static imbalance. We call this phenomenon static loss of vibration. The balanced speed of rotation equivalent to the element can be called the rotary velocity of angular vibration or the rotary velocity of static loss of vibration. These rotary velocities can be calculated as follows:

$$\Delta_0 \neq 0, \quad \Delta = 0$$

$$\begin{aligned}
&(C_{11}-M_1\omega^2)[2kl^2-(I+I_2+2M_2l^2)\omega^2](C_{22}-I\omega^2) \\
&-C_{12}^2[2kl^2-(I+I_2+2M_2l^2)\omega^2]-(I_0\omega^2)^2(C_{11}-M_1\omega^2)=0 \\
&[M_1I_0^2-M_1I(I+I_2+2M_2l^2)]\omega^6+[2kl^2IM_1+(C_{22}M_1+C_{11}I) \\
&(I+I_2+2M_2l^2)-C_{11}I_0^2]\omega^4+[C_{12}^2(I+I_2+2M_2l^2) \\
&-2kl^2(M_1C_{22}+IC_{11})-C_{11}C_{22}(I+I_2+2M_2l^2)]\omega^2 \\
&+2kl^2(C_{11}C_{22}-C_{12}^2)=0 \qquad (16)
\end{aligned}$$

In summary, when the gyro rotor is balanced on the dynamic balancing machine, motion of the vibrating system is composed of horizontal movement and rotary motion. The numerical values of the shift ξ of horizontal movement and angular shift θ of rotation vary according to the vibration center distance L_v of the system. When the value of the vibration center distance L_v approaches infinity, the system's angular shift $\theta = 0$. Thus, the phenomenon of dynamic loss of vibration in which only the shift of horizontal movement can be measured and angular shift cannot be measured exists. The corresponding balanced speed of rotation is called the rotary velocity of linear vibration. When the vibration center distance $L_v = 0$, the shift of horizontal movement of the system $\xi = 0$. Thus the phenomenon of static loss of vibration in which only the dynamic imbalance can be measured but the component of stationary imbalance cannot be measured exists. The corresponding balanced speed of rotation is called the rotary velocity of static loss of vibration or the rotary velocity of angular vibration.

VI. Actual Example of Computation

Now we take the thin walled flexible shaft rotor of the 601 model navigational gyro compass as an example to perform numerical calculations.

1. Known parameters

$$I_e = 54\times 10^{-3}\ \text{kg cm sec}^2$$
$$I = 28\times 10^{-3}\ \text{kg cm sec}^2$$
$$I_3 = 13\times 10^{-3}\ \text{kg cm sec}^2$$
$$M_1 = 2.25\times 10^{-3}\ \text{kg cm}^{-1}\ \text{sec}^2$$
$$M_2 = 0.6990\times 10^{-3}\ \text{kg cm}^{-1}\ \text{sec}^2$$
$$M_3 = 0.1653\times 10^{-3}\ \text{kg cm}^{-1}\ \text{sec}^2$$

2. Influencing coefficients: C_{11}, C_{21}, C_{12} and C_{22}

The shaft of the gyro rotor of the 601 model is spindle shaped. It is a rotary shaft with a variable section. When computing the influencing coefficients of the rotary shaft we can simplify it and consider it as a stepped shaft. The numerical values computed are:

$$a_{11} = 13.50\times 10^{-4}$$
$$a_{12} = a_{21} = 0.4151\times 10^{-4}$$
$$a_{22} = 1.087\times 10^{-4}$$

According to equations (6), we can compute and obtain:

$$C_{11} = \frac{a_{22}}{a_{11}a_{22} - a_{12}a_{21}} = 750.1$$
$$C_{12} = \frac{a_{12}}{a_{11}a_{22} - a_{12}a_{21}} = 286.4$$
$$C_{22} = \frac{a_{11}}{a_{11}a_{22} - a_{12}a_{21}} = 93.15$$

3. The frequency of harmonic oscillation of the system

From equations (10):

$$\begin{cases} \xi = a_1 \sin(\omega t + \varphi_1) \\ \theta = a_3 \sin(\omega t + \varphi_1) \end{cases}$$

From equations (12)

when
$$\begin{cases} a_1 = \dfrac{m_1 r\omega^2}{2k - (M_1 + M_2 + 2M_3)\omega^2} \\ a_3 = \dfrac{\Delta_\theta}{\Delta} m_1 r\omega^2 \end{cases}$$

$2k - (M_1 + M_2 + 2M_3)\omega^2 = 0$ 时, $a_1 \to \infty$, $\xi \to \infty$

$\Delta = 0$ 时, $a_3 \to \infty$, $\theta \to \infty$

Actually, because of the effect of damping, ξ and θ cannot approach infinity but can cause harmonic oscillation.

Now let us find the frequency of linear vibration and the frequency of angular vibration.

$$\omega^2 \text{ linear vibration } = \frac{2k}{M_1 + M_2 + 2M_3} = 0.3354 \times 10^3$$

ω linear vibration = 18.31 radians/second = 174.88 revolutions/minute.

The vibration frequency occurs when $\Delta = 0$. From equations (16) we can obtain the frequency of angular vibration. First we simplify equations (16) as follows:

$$A_0\omega^6 + A_1\omega^4 + A_2\omega^2 + A_3 = 0$$

$$A_0 = M_1 I_0^2 - M_1 I (I + I_2 + 2M_3 l^2)$$

$$A_1 = 2kl^2 I M_1 + (C_{22}M_1 + C_{11}I)(I + I_2 + 2M_3 l^2) - C_{11} I_0^2$$

$$A_2 = -[2kl^2 (C_{22}M_1 + C_{11}I) + (C_{11}C_{22} - C_{12}^2)(I + I_2 + 2M_3 l^2)]$$

$$A_3 = 2kl^2 (C_{11}C_{22} - C_{12}^2)$$

Substituting the values of known parameters for the terms A_0, A_1,......... we have:

$$A_0 = 3.125 \times 10^{-6}$$

$$A_1 = 0.104$$

$$A_2 = -3.785 \times 10^5$$

$$A_3 = 3.111 \times 10^8$$

$$3.125 \times 10^{-6}\omega^6 + 0.104\omega^4 - 3.785 \times 10^5\omega^2 + 3.111 \times 10^8 = 0$$

Solving the above equation we obtain the frequency of harmonic oscillation of vibration:

ω angular vibration 1 = 28.673 radians/second = 273.81 revolutions/minute.

ω angular vibration 2 = 575.63 radians/second = 5496.86 revolutions/minute.

Now we find the rotary velocity of static loss of vibration and the rotary velocity of dynamic loss of vibration:

Rotary velocity of static loss of vibration: The rotary velocity of static loss of vibration is the frequency of angular vibration:

ω_1 = 273.81 revolutions/minute, ω_2 = 5496.86 revolutions/minute.

The rotary velocity of dynamic loss of vibration can be obtained from equations (14) and (15):

When $h = 1.6$ cm

ω_3 = 174.88 revolutions/minute
ω_4 = 2894.6 revolutions/minute
ω_5 = 6095 revolutions/minute

When $h = -1.6$ cm

ω_3' = 174.88 revolutions/minute
ω_4' = 3801 revolutions/minute
ω_5' = 4640.1 revolutions/minute

VII. The Vibration Center Distance Curve and Rational Balancing Speed of Rotation

When the flexible shaft rotor is being balanced on the dynamic balancing machine, the curve of variation between the system's vibration center distance L_v and the balancing speed of rotation ω is much more complex than the situation when the shaft rotor is rigid. Table 1 lists the relationship between the vibration center distance L_v and the balancing speed of rotation when the gyro rotor of the 601 model compass is being balanced on the A-21 model dynamic balancing machine. Figure 4 shows the curve drawn from the points of functional relations between the two. The solid line h is the curve of positive values. The dotted line h is the curve of negative values. Figure 4 shows that the solid line and the dotted line are symmetric about the horizontal axis in some regions while in other regions they are basically symmetric and in some other regions they are asymmetrical. In the regions where the solid line and the dotted line are symmetrical about the horizontal axis, as long as the center of mass of the rotor is at the midpoint of the two left and right supports, the balancing speed of rotation is relatively far away from the frequency of loss of vibration. Under this situation, the center distances L_v of the vibrating system are equal but in opposite direction. When an unbalanced weight exists on the right balance plane and the right transducer shows a certain value ε, and when the same unbalanced weight exists on the left balance plane, the value shown by the left transducer is equivalent to ε and corresponds to it. This conforms to the demands of the test. But in certain regions in Figure 4, the solid line and the dotted line are on the same side of the horizontal axis. At this time, regardless of whether the unbalanced weight is on the left balance plane or the right balance plane, the direction of this imbalance shown by the left (or right) transducer will be the same. This means, the measuring system of the balancing machine cannot differentiate the signal of

Table 1. Relationship Between the Balancing Speed of Rotation ω and the Vibration Center Distance L_v

ω	(1)	转/分	0	100	150	174.88	200	273.81	500	1000	1500	2000	2500
	(2)	弧度/秒	0	10.5	15.7	18.313	20.9	28.673	52.4	105	157	209	262
L_v	(3)	实线 (厘米)	−25.6	−33.1	−67.8	±∞	37.9	−0.000	−8.6	−11.6	−14.7	−21.4	−46.4
	(4)	虚线 (厘米)	25.6	33.1	67.8	±∞	−37.8	0.000	8.6	11.2	13.4	16.9	24.3
ω	(1)	转/分	2776	2830	2894	2895	3000	3009	3300	3500	3540	3600	3800
	(2)	弧度/秒	290.7	296.4	303.06	303.16	314	315.1	345.6	366.5	370.7	377	Ɛ98
L_v		实(5)线	−150	−276	−47745	29882	166.9	152.7	41.6	27.3	25.5	23.2	16.5
		虚(6)线	31.8	33.8	36.5	36.5	42.1	42.7	72.4	128.5	150	200.3	28293
ω	(1)	转/分	3802	4000	4106	4297	4393	4500	4640	4641	4730	4760	4830
	(2)	弧度/秒	398.2	419	430	450	460	471	485.9	486	495.3	498.5	505.8
L_v		实(5)线	16.5	14.0	12.5	10.4	9.5	8.6	7.5	7.5	6.8	6.6	5.4
		虚(6)线	−141024	−263.1	−192	−159	−171	−229	−193421	27995	213	147	78.8
ω	(1)	转/分	5000	5496.86	5800	6000	6095	6096	6150	6300	6500	7000	
	(2)	弧度/秒	524	575.63	607	628.3	638.27	638.37	644	660	681	773	
L_v	(1)	转/分	4.8	−0.000	−8.1	−40.4	−9208	9609	89.2	27.8	16.9	10.4	
	(2)	弧度/秒	26.2	−0.000	−3.2	−4.1	−4.4	−4.4	−4.6	−4.9	−5.1	−5.3	

Key:
(1) revolutions/minute
(2) radians/second
(3) solid line (centimeter)
(4) dotted line (centimeter)
(5) solid line
(6) dotted line

imbalance on two different left and right balance planes. Therefore, the balancing speed of rotation of the part of the vibration center distance curve on the same side of the horizontal axis cannot be taken. The vibration center distance curve is on both sides of the horizontal axis but the solid line and the dotted line are asymmetric. The variation of the vibration center distance is larger. When the balancing speed of rotation is slightly unstable, or when the power source is unstable and cause the balanced speed of rotation to become unstable, variations in the vibration center distance will occur. The quality of balancing the rotor in these regions is poorer. The balancing speed of rotation in regions where the solid line and the dotted line of the vibration center distance curve are asymmetric about the horizontal axis also cannot be taken. In summary, the balancing speed of rotation taken should be within the region where the solid curve and the dotted curve are respectively on the two sides of the ω axis and are mutually symmetric about the ω axis. The speeds of rotation from 300 to 2,000 and greater than 7,000 can all be taken as the balancing speed of rotation.

VIII. Effect of Damping Upon the Quality of Balancing

To improve the precision of balancing by improving the stability of the vibration center distance of the vibration testing system, ordinarily the gyro rotor is balanced at its operating speed of rotation (high speed). To a sealed gyro rotor, the effect of damping is not great. But to an unsealed gyro rotor, the effect of damping on the quality of balancing should be taken into consideration. We know from vibration theory that damping has a visible effect upon amplitude and the phase angle. Figure 5 and Figure 6 show the characteristic curves of amplitude frequency and phase frequency of the vibrating system with one degree of freedom. D is the damping coefficient, ω is the rotary speed of the rotor, ω_0 is the critical speed of rotation of the vibrating system, φ is the phase angle, V_1 is the ratio of amplitude to static positional change. The diagrams show that when the frequency ratio is fixed, the numerical values of the amplitude and the phase angle vary as the damping coefficient varies. Measurements of the amplitude and phase angle of a rotor being balanced at a balanced speed of rotation will be different if damping is different. Theoretically, a rotor being balanced at one speed of rotation should have the same amplitude and phase angle. But in actuality, the same rotor under different damping conditions will yield different measurements of amplitude and phase angle. This fact seriously affects the quality of balancing the rotor. To prevent the occurrence of this phenomenon, some measures can be taken: such as placing the rotor in a vacuum for balancing or balancing the rotor at high speeds and in high temperatures, or adjusting the mechanical system of the balancing machine so that the rotor is balanced within the stable regions of the characteristic curves of the amplitude frequency and the phase frequency.

XI. Several Suggestions

1. When the rotor is being balanced on the balancing machine, the vibrating system moves about the vibration center. The distance between the vibration center and the center of mass of the rotor is called the vibration center distance. The vibration center distance is related to the system's rigidity, the

distance of the transducer to the center of mass of the rotor and the balanced speed of rotation. When the vibration center distance is zero, the vibrating system undergoes only angular vibration, the stationary imbalance on the rotor cannot be measured. When the vibration center distance approaches infinity, the vibrating system undergoes only linear vibration, and the dynamic imbalance on the rotor cannot be measured. These two situations should be avoided.

2. To avoid the two situations mentioned above, an appropriate balancing speed of rotation should be chosen. The balancing speed of rotation should be far away from the speed of rotation that produces the above phenomena.

3. Besides selecting an appropriate balancing speed of rotation, the rigidity of the vibrating system or the distance of the left and right transducers to the center of mass of the rotor can also be appropriately adjusted. Adjusting the rigidity and the transducers--distance from the center of mass can also produce a balancing speed of rotation that is far from the rotary speed of loss of vibration.

4. Damping affects the numerical values of the amplitude and the phase angle of the vibrating system relatively greatly. For some rotors of a higher precision, the effects of damping should be avoided in balancing. To realize this, balancing can be done in an environment where damping is very small.

5. Field balancing under operating conditions of the rotor is effective in improving the quality of balancing. Hard support balancing machines that do not use supports are also advisable.

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APPLIED SCIENCES

MODEL-140 DEBUGGING PROGRAMS DETAILED

Liaoning ZHONGXIAOXING JISUANJI [MINI-MICRO SYSTEMS] in Chinese No 2, 25 Apr 80 pp 18, 29

[Excerpt]The model 140 machine has two debugging programs: a symbol debugging program III allowing interruption and a debugging program which does not allow interruption. They provide the user with a breakpoint facility for debugging his own programs and they provide partial printouts of some information, perform editing and search functions for specific commands or data to monitor and control the user's programs.

Assembly programs provide the function to connect and assemble each program. It can assemble certain floating binary documents and stored documents into executable stored documents. The assembly program can also be used to create user overlays.

The above compiler programs and service programs can operate under all kinds of operational systems. The following two service programs are provided for binary forms and can be used independently.

Duplicate paper tape programs can duplicate any type of binary paper tape and can be used to check on the accuracy of new duplicating paper tape.

Magnetic disc editing programs can be used to directly edit or restore certain messages in the index magnetic disc, and thus restore documents on magnetic discs that have not been destroyed.

4. Auditing and Diagnostic Programs

To coordinate with the debugging and maintenance of hardware, the 140 machine is equipped with various kinds of auditing and diagnostic programs. These programs can find malfunctions for the debugger and can carry out error registration correctly to pinpoint the malfunctioning part. The auditing and diagnostic programs of the 140 machine include: CPU logic diagnostic program, arithmetic auditing program, internal storage auditing programs I, II, III, basic peripheral auditing program, complete practice auditing program, power source cutoff and start up and restart up auditing program, teletypewriter auditing program, paper tape input auditing program, paper tape puncher auditing program, character display auditing program, digital plotter auditing program, wide line printer auditing program, real time clock auditing program, internal management and maintenance parts auditing program, QTY multiplex auditing program, floating point computation components auditing program, movable head magnetic disc logic diagnostic program, movable head magnetic disc reliability auditing program, fixed head magnetic disc logic diagnostic program, fixed head reliability auditing program, magnetic tape drive logic diagnostic program, magnetic tape drive reliability auditing program, miniature magnetic tape drive logic diagnostic program, minature magnetic tape drive reliability auditing program and multiple I/O equipment reliability auditing program.

III. Program Storage and Program Package

The 140 machine is equipped with a floating point interpretive program, FORTRAN operation program (storage and data plotting program package (DATA PLOT)) and it is also equipped with other kinds of application software and program packages.

1. The floating point interpretation package. This enables the machine to perform various kinds of operations and computations of floating point numbers by software when the floating point unit (FPU) is not available.

2. FORTRAN operational program storage. This provides a complete set of subroutines for the various kinds of data formates, multiple computations of character strings and for using multiple task systems of documents, equipment and indexes.

3. Data plotting package. This provides a series of standard subroutines for a systematic use of the plotter, such as plotting coordinates, origin and lines.

4. Buffer input/output package (BFPKG). It enables one to use the buffer processing method to increase the processing efficiency of the I/O equipment. The use of the various kinds of OPEN, READ/WRITE and CLOSE commands provided by this program package can replace the READ/WRITE commands of related documents in RDOS and MRDOS, at a higher processing speed.

5. Scientific computation package I, II. These are standard subroutines of many frequently used computational methods used in scientific, technological and engineering computations. NSPI includes various types of matrix computations, ordinary differential equations, numerical differentiation and numerical integration totaling 10 standard programs. NSPII includes multiple regressive analysis, correlation analysis and various types of statistical analysis programs totaling 12 programs.

6. Discrete Fourier Transform. This is a data processing method often used in scientific and technological computations. This program package provides a software subroutine for that method of computation.

IV. Application of the DJS140 Machine

The DJS140 is a small sized general purpose digital computer of multiple functions. It is suitable for use in various types of real time process controls and medium and small scale scientific and technological computations:

1. Real Time Process Control. To adapt to real time processing demands, the 140 machine has been designed to possess real time clocks of various clock frequencies and the capability to respond to the data channels in the course of execution of commands. The functions of channel plus "1" and channel add have provided an important means for carrying out computations of probabilities of the data collected during the course of real time processing. The software systems of the 140 machine are completely oriented towards real time applications, such as real time FORTRAN and real time operating systems. The 140 machine can be equipped with a digital-analog (DA) and analog-digital (AD) converter and a process input/output system (PIO), which can be used to monitor, control and manage production processes.

2. Scientific and Technological Computations. The 140 machine's floating point unit can perform computations of 14 to 15 significant digits of the decimal system. This basically satisfies the ordinary demands of engineering and scientific and technological computations. The 140 machine also provides the user several more commonly used computational languages, such as BASIC, ALGOL 60, FORTRAN. The systems software of the 140 machine are not extensive but are representative. Thus they are better suited for use as teaching materials for institutes of higher learning to establish computer centers. At present, writing of a lot of teaching materials by the computer staff of the nation's scientific and engineering fields has combined the systems software of the 100 series machines.

3. Data Processing. The 140 machine has provided a medium for large capacity storage of documents and large amounts of data on magnetic disc and magnetic tape storage systems. The documentation system and other related programs can perform such functions as collecting, storing, transmitting, classifying and various output processing of all kinds of data. The system can also provide corresponding management programs and software packages for asynchronous multiplexors and far end users to realize real time or time shared management by the user of the terminals.

4. Processing of Graphs. The 140 machine is equipped with graphic output equipment, such as digital plotter and corresponding software (such as DATA PLOT programs package). The 140 machine can perform refining and processing of many kinds of graphs.

5. Multiple machine systems and networks. The 140 machine is equipped with a machine-machine trunk line drive that enables duplex operation of duplex machines or dual processing by duplex machines. The two machines can work independently while using the same magnetic disc as when a duplex computer system shares a magnetic disc for communication between programs. When only one machine malfunctions, the other standby machine can switch over to continue to perform the processing function. Two machines can also share the load of processing by working as a duplex. All of these methods can increase the reliability

of the system or expand the processing capabilities of the system. The multiple processor's communications converter of the 140 machine provides connection and communication among as many as 15 computers, forming a multiple machine system. The 140 machine is also equipped with special interfaces and corresponding program packages that can interface with IBM series machines. This makes the 140 machine easy to expand into a multiple machine system or to be connected to a computer network.

At present, the 140 machine is being mass produced by the Beijing Computer Plant No 3, Jinzhou Radio Plant No 2 and Liaoyuan Radio Plant No 3.

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TITLE: "Experiments and Calculating Method for the Cracking Strength and the Maximum Crack Width in Reinforced Concrete Members"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 1-17

TEXT OF ENGLISH ABSTRACT: The experiments and data of reinforced concrete members subjected to bending, eccentric compression and eccentric tension are presented in this paper. Discussions are made on the equations for calculating the cracking strength of reinforced concrete members and the parameter γ involved in these equations to consider the plastic behavior of the tension zone.

A formula for calculating the value of γ and an empirical formula for calculating the maximum crack width in reinforced concrete members are proposed. The recommended formulas are verified with test data obtained from the research work of DIT and other institutes.

AUTHOR: JIANG Dahua [5592 1129 7520]
LIANG Mintao [2733 2404 3325]

ORG: JIANG of Tongji University; LIANG of the Second Design Institute, Ministry of Agricultural Machinery

TITLE: "Flexural Strength of Single Footing and Innovation in the Arrangement of Reinforcement"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 18-27

TEXT OF ENGLISH ABSTRACT: Several upper and lower bound solutions based on the theory of plasticity for the flexural strength of single footing under column load are presented. The results show that the formula used in current practice for determining the area of reinforcement is unsafe and a more reasonable one is recommended. Instead of the rectangular net usually used in practice, the use of more economical circumferential reinforcement for the footing is suggested in this paper, which would save nearly 20 percent reinforcement. Test results are also reported.

AUTHOR: DING Yunsun [0002 0061 1327]
HU Caiyuan [5170 2088 3293]

ORG: Both of the Fourth Planning Design and Research Institute, Third Ministry of Machine Building

TITLE: "A 54 x 48 m Space Truss Roof Hangar"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 28-32

TEXT OF ENGLISH ABSTRACT: A space truss roof hangar with three sides supported and one side free is reported in this paper. The structural pattern used for the space truss roof was inclined square mesh with lower chords parallel to the boundaries. A stiffening girder was used on the free side, i.e., an additional layer of inclined square mesh was installed on the top of the space truss within the two panels along the door opening. A strengthening effect was provided by the stiffening girder, so that the space truss beyond the stiffening girder is acting as if it is being supported along four sides.

The entire roof structure was assembled on the ground and raised with hydraulic jacks which were used for lifting the slip forms of the concrete columns. The slip forms and the raising of the space truss proceeded simultaneously and satisfactory results were obtained.

AUTHOR: CHEN Yongchun [7115 3057 2504]
et al.

ORG: All of Wuxi Building Construction Bureau, Chinese Academy of Building Research, Jiangsu Building Research Institute

TITLE: "Multistory Factory Building System of Longitudinal Frames Using Lift-Form Technique"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 33-37

TEXT OF ENGLISH ABSTRACT: A new longitudinal frame building system with lift-form technique for the construction of multistory factories is presented in this paper. In this system, the frames and wall panels are constructed by means of the lift-form casting; along the exterior longitudinal frames the girders serve both as load bearing beams and walls. Only light lifting equipment (i.e., tower crane of 25 t-m) are needed for constructing five-story or taller factory buildings. The design and construction practice of three multistory factory buildings in Wuxi has shown that a fast speed in construction and good technical and economical results were attained by the use of this system.

AUTHOR: WU Qiyun [0702 4860 5366]
TIAN Jiahua [3944 1367 7520]
XU Xianyi [1776 7359 3015]

ORG: All of the Chinese Academy of Building Research and Beijing Polytechnical University

TITLE: "A Study of the Behavior of Brick Infilled Frame Structures under Monotonic and Reversed Cyclic Horizontal Loads"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 38-44

TEXT OF ENGLISH ABSTRACT: Based on the experimental study of the process of working stages to failure of reinforced concrete frame structures infilled with brick walls under monotonic and reversed cyclic horizontal loads and analyses of their properties on deformation and destruction, formulae for calculating the ultimate strength and stiffness at three different working stages are given in this paper. The results obtained from computation and tests show reasonable agreement in comparison. Furthermore, the restoring force characteristic model and elastoplastic characteristic parameters of the structural members of this kind of structure are also given in the paper.

AUTHOR: NIU Zezhen [6873 3419 5550]

ORG: Chinese Academy of Building Research

TITLE: "Calculating Methods of Strengthening and Repair of Brick Masonry Structures for Earthquake Resistance"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 45-54

TEXT OF ENGLISH ABSTRACT: Calculating methods of strengthening and repairing measures of brick masonry structures are described in this paper. These methods are based on the available testing data of the institutes concerned. The strengthening and repairing measures used are as follows:
1. Cement mortar coating, reinforced cement mortar coating attached to the wall surfaces or reinforced concrete columns with tie beams were used for strengthening walls.
2. Reinforced cement mortar attached to the surface or steel angles at the corners were used for strengthening columns.
3. Vertical and circular steel strips attached to the surface were used for strengthening chimneys.

This paper shows that the results calculated by these methods are closer to the testing data than are those calculated by the currently available methods.

AUTHOR: TANG Daixin [0781 1486 2450]
LUO Weiqian [5012 4850 0467]
MENG Xianjun [1322 2009 0689]

ORG: All of Harbin Institute of Civil Engineering

TITLE: "The Testing and Analysis of Local Bearing Strength of Brick Masonry"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 55-65

TEXT OF ENGLISH ABSTRACT: Several sorts of basic failure mechanism of local bearings of brick masonry are observed through many tests. Together with the analysis of the computed results obtained from a computer, the actual working behavior of local bearing of brick masonry is presented. The problems existing in the formula in the current code for calculating the local bearing strength of brick masonry are then studied and a practical formula conforming more to real conditions is suggested in this paper.

AUTHOR: ZHANG Wenqing [1728 0795 3237]
ZHAO Xihong [6392 6932 1347]

ORG: Both of Tongji University

TITLE: "A Step-by-Step Extended Substructure Model for Computing the Stiffness of Tall Buildings"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 66-70

TEXT OF ENGLISH ABSTRACT: In applying the conventional substructure method to soil--tall building interaction, the number of structural elements always exceeds the capacity of available computer programs. For this purpose, a step-by-step (story-by-story, bay-by-bay or joint-by-joint) extended substructure method is presented in this paper. By comparison, it has an advantage over the routine substructure method.

AUTHOR: FANG Shimin [2455 0013 2404]

ORG: Shanghai Municipal Institute of Civil Architecture Design

TITLE: "The Use of Substructural Analysis Method for Superstructure-Foundation Interaction"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURE] in Chinese Vol 1 No 4, 5 Nov 80 pp 71-79

TEXT OF ENGLISH ABSTRACT: In this paper the principle of substructure analysis of matrix displacement method is used to condense superstructural stiffness of tall buildings to the boundary stiffness of the foundation beams, and the subsoil model of the layers summation procedure of the finite compressible layer is introduced herein. The flexibility matrix of the subsoil at the interface is attained by means of the integral transformation of settlement at the interface of the subsoil acting with rectangular loading. When conditions of the deflection compatibility and the boundary restraint at the interface are satisfied. a set of matrix equations of displacement of the foundation beam is made, which is equivalent to the actual conditions, and the calculation is simplified in this way. In the paper, numerical examples are provided as well.

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AUTHOR: LIU Hongyun [0491 7703 0336]
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TITLE: "Problems of Classification and Correlation of the Sinian System"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 307-321

EXCERPT FROM ENGLISH ABSTRACT: There exists a number of problems in the Sinian system research, especially the stratigraphic classification and correlation, which need to be inquired into and discussed deeply and repeatedly. The present paper lays emphasis on the argument concerning the scope, diverse facies, principle of classification and correlation of some representative lithostratigraphic units of the Sinian system.

AUTHOR: LI Congxian [2621 1783 0341]
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XU Shiyuan [6079 0013 6678]
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ORG: All of the Department of Marine Geology, Tongji University

TITLE: "Holocene Transgressive-Regressive Sequence in the Changjiang Delta Area"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 322-330

TEXT OF ENGLISH ABSTRACT: The Changjiang delta area has undergone a transgression caused by postglacial rapid rise in sea level and regression resulting from delta progradation. Consequently, the Holocene lithofacies relationship may be grouped into transgressive and regressive sequences. The transgressive-regressive sequence in the delta plain of the Changjiang consists of transgressive channel-fill sequence and overlying deltaic sequence. On the strandplain the transgressive sequence is composed mainly of barrier-lagoonal deposits; the regressive sequence consists of radiated bar sedimentary complex on the northern flank of the Changjiang and of progradation of tidal flat on the southern flank.

Transgressive-regressive sequences in the Changjiang delta area show a distinct cyclothem in ascending order: the variation in grain sire is coarse-fine-coarse;

[Continuation of DIZHI KEXUE No 4, 1980 pp 322-330]

facies relationship: littoral-shallow marine-littoral; apparent resistivity pattern--high-low-high; climate referred by sporal-pollen assemblage is cold-temperate-cool. The changes of these features can be correlated fairly well with each other.

With the alternation of transgression and regression the sand bodies are characterized by double beds in vertical distribution. The transgressive sand bodies are overlain by the regressive ones, and between them exists a wedge marine clay.

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ORG: LUO of the Department of Mining and Metallurgy, University of Fuzhou; YAN of the Regional Geological Survey Team, Geological Bureau of Fujian

TITLE: "On the Horizon and the Age of Main Seam of Makeng Type Iron Deposits in Southwestern Fujian"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 331-339

EXCERPT FROM ENGLISH ABSTRACT: A careful study of the profile exposed in the Lufong area of Shanghang district has enabled the authors to draw a new detailed section to accurately show the Carboniferous stratigraphical sequence of Fujian Province. It is shown by examining the outcrops and cores that the main seam of Makeng type iron deposits, occurring in the Longyan and Shanghang districts of southwestern Fujian, lies disconformally on the Lindi Formation and is overlain conformally by carbonate rocks. Recent studies on the fossils collected from the overlying and underlying strata afford the evidence to determine the horizon and the age of the main seam of iron deposits.

AUTHOR: ZHANG Qi [1728 2475]
ZHANG Zhenyu [1728 2182 4416]
LI Shaohua [2621 8734 5478]

ORG: None

TITLE: "Muscovite of Metamorphic Rocks in East and South Xizang and Its Petrological Significance"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 340-347

TEXT OF ENGLISH ABSTRACT: In this paper, the authors deal with nine samples of muscovite collected from Xizang, China. The X-ray powder diffraction pattern of the muscovite indicates that its b_0 value varies with the metamorphic pressure, i.e., the higher the pressure is, the larger the b_0 value is, thereby serving as an indicator of metamorphic pressure. However, d_{002} decreases with the increase of pressure. Obviously, the high pressure condition favors the formation of muscovite with small basal spacing and large horizontal spacing. Likewise, the mineral composition of muscovite can also be correlated to a certain extent with the metamorphic pressure. MgO in muscovite may be taken as a particularly good indicator of metamorphic pressure. The authors suggest that two types of original rock series, i.e., metapelites and metabasites, can be recognized. Therefore, diagrams of MgO vs RM and Si vs Mg of the muscovite-phengite series of greenschist-glaucophane schist facies were constructed by the present authors and are presented in this paper. Two

[Continuation of DIZHI KEXUE No 4, 1980 pp 340-347]

areas, medium pressure facies series areas and high pressure facies series areas, are distinguished. The latter can be further subdivided into Area I, which contains glaucophane assemblages, and Area II, which contains no glaucophane assemblages. The samples from Yarlung Zangbo Jiang metamorphic belt in Xizang fall into the field of Area II.

AUTHOR: CHEN Jishi [7115 3423 4258]

ORG: None

TITLE: "The Old Tidal Deposits in the Xuanhua Area, Hebei Province"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 348-355

TEXT OF ENGLISH ABSTRACT: About 1.8 b.y. ago, the marine transgression taking place in the Xuanhua area, Hebei Province, transformed this area into a bay opening toward the east and extending east-west. The marine terrigenous clastic sediments with a thickness of approximately 200 m were deposited there. The various types of primary sedimentary structures marking clastic tidal environment are well developed in these sediments, such as herringbone cross-bedding, lenticular bedding, wavy bedding, flaser bedding, beach cross-bedding, tidal channel and tidal channel fill of cross-bedding, reactivation surfaces, interference ripple marks, mud cracks, and penecontemporaneous deformation structure. This paper makes a brief discussion of the origin and distribution of these sedimentary structures.

Based on lithological characteristics and succession, the primary sedimentary structures and their sequences, as well as the grain size distribution of sediments, the late Precambrian tidal depositional environment in this area can be subdivided as follows: tidal flat (high-tidal flat, mid-tidal flat and low-tidal flat), sandy

[Continuation of DIZHI KEXUE No 4, 1980 pp 348-355]

beach, algal flat and oolitic bank, and shallow sea. Moreover, the main sedimentary features of these sub-environments are described and two types of depositional models for the area studied are proposed. Finally, paleocurrent regime is also briefly investigated.

AUTHOR: WEI Mingxiu [7614 2494 4423]

ORG: Institute of Geology, Ministry of Metallurgy

TITLE: "Unit Cell Constant and Genetic Character of Chrome Spinels"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 356-367

TEXT OF ENGLISH ABSTRACT: The unit cell constant (a), specific gravity (G), reflectivity (R), microhardness (H) and chemical composition of 30 chrome spinel samples from deposits of different genesis in China were determined. Based on crystallo-chemical properties, a new formula for the unit cell constant of chrome spinels is proposed: $a = 8.367\ \text{Å} - 0.01745\ (Al^{+3})\text{Å}$, where (Al^{+3}) is the number of Al^{+3} in the unit cell. It is more accurate than Mikheev's formula. The composition of chrome spinel could be calculated directly from its unit cell constant by the formula: $(Al^{+3}) = 479.45 - 57.3a$. Based upon the theoretical calculation, a new curve showing the relation between sp. gr. and composition is plotted. From the above relationship it is easy from a and G to derive the crystal chemical formula: $R_8^{+2}\ (Mg^{+2}, Fe^{+2})\ R_{16}^{+3}\ (Al^{+3}, Cr^{+3} + Fe^{+3})\ O_{32}$. A tetragonal composition diagram Mg^{+2}-Fe^{+2}-Al^{+3}-$(Cr^{+3}+Fe^{+3})$ of chrome spinels constructed from a and G is also given. It is clearly shown that the chrome spinel of the geosynclinal type (Alpine type) is quite different from that of the platform type (or stratiform type). A simplified

[Continuation of DIZHI KEXUE No 4, 1980 pp 356-367]

classification method for chrome spinel groups is proposed. "Molecular Iron Content F_{Cr}" is probably an important factor of metallogenetic process and can be used as an indicator for the enrichment of chromite ore. Finally, some mineralogical characters of the chrome spinels associated with platinum deposits are discussed.

AUTHOR: SUN Guangzhong [1327 1639 1813]
ZHOU Ruiguang [0719 3843 0342]

ORG: None

TITLE: "The Structural Effect of Rockmass Deformation and Failure"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 368-376

TEXT OF ENGLISH ABSTRACT: The rockmass strength of jointed sedimentary rock often shows a distinct scale effect. In fact, it is a reflection of the rockmass structure effect. This view has been confirmed by our tests on the pressure-resistance of jointed slates *in situ*. Moreover, the results from these tests with jointed slate specimens of different sizes *in situ* indicate that the pressure-resistance strength of the rockmass is distinctly related to the number of structure bodies in the rockmass rather than to the size of specimens. Taking into consideration the results of tests and using a statistical method, we found that the relationship between the uniaxial compression strength of slate rockmass and the structure bodies number N in test specimens can be expressed as $\delta_m = 24 + 236N^{-0.36}$.

AUTHOR: ZHAO Qingsheng [6392 1987 3932]

ORG: The Geological Team, Shanxi Designing Institute of Water Conservancy and Electric Power

TITLE: "Wenjiashan Lotus-Shaped Structure and Its Characteristics of Engineering Geomechanics of Rock Mass"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 377-385

TEXT OF ENGLISH ABSTRACT: Based on field investigations and the results of rock mechanics tests, the Wenjiashan lotus-shaped structure and its engineering geomechanical conditions of the rock mass are discussed in this paper.
1. The Wenjiashan lotus-shaped structure is a small twirling structure which consists of a group of rotational faults caused by torsional compression forces;
2. Within the lotus-shaped structure, different types of rock mass structures show different distribution patterns which are strictly controlled by both whirl planes and whirl strata. Each type of rock mass structure has its own mechanical characteristics;
3. According to the deformation properties of rock masses in the lotus-shaped structure, four zones (or regions) can be distinguished: elastic deformation zone, quasi-elastic deformation zone, elasto-plastic deformation zone and plastic deformation zone;

[Continuation of DIZHI KEXUE No 4, 1980 pp 377-385]

4. Both the nuclear pillar and the central parts of the whirling strata within the lotus-shaped structure are favorable regions of engineering geomechanical conditions, i.e., the elastic and quasi-elastic deformed zone; the marginal parts of the whirling strata, i.e., elasto-plastic deformed zone, are the less favorable regions, and all of the plastic deformed zone in the whirling planes is the unfavorable region.

AUTHOR: SUN Yijian [1327 0110 6169]

ORG: Nanjing Geological Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences

TITLE: "About a Method for Calculating the Cell Dimensions of Low Symmetrical Rock-Forming Minerals"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 386-394

TEXT OF ENGLISH ABSTRACT: In this paper, the author proposes a method for calculating the cell dimensions of low symmetrical rock-forming minerals on the basis of determinations made on their X-ray powder patterns. This method is applicable to the data obtained from both the diffractometer and the 57.3 mm powder camera. In fact, it is a smoothing process based on a weighted least-square fitting combined with corrected indexing by iteration. A computer program in ALGOL 60 language has been written by the author and has been successfully run on a 709 computer.

AUTHOR: BIE Wanlin [0446 1238 3829]
DONG Guangfu [5516 0342 1788]

ORG: None

TITLE: "Semimicro-analysis of Fluorine in Minerals by a Method of Fluorine-Ion Selected Electrode"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 399-402

TEXT OF ENGLISH ABSTRACT: This paper introduces a method for directly determining fluorine without any separation procedure. It can be used in the presence of ethyl alcohol, and potassium citrate as ionic strength adjustment buffer (pH 6-6.5). The determinations indicate that this method has some advantages, such as high sensitivity and the Nernst linear extent up to 1×10^{-1} M - 1×10^{-6} M, one order higher in magnitude than the usual ones. Moreover, the method proposed here requires samples smaller in amount (1-5 ml). In general, it is applicable for determining fluorine in minerals.

AUTHOR: PEI Jingxian [5952 7234 1288]

ORG: None

TITLE: "Thermoluminescence Datings of the Cave Deposits in Zhoukoudian and the Volcanics of Baked Layer in Datong, Shanxi Province"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 403-405

TEXT OF ENGLISH ABSTRACT: The thermoluminescence datings of some samples collected from the Zhoukoudian cave and the volcanic areas in Datong are given in this paper.

The cave deposits of Upper Cave in Zhoukoudian give the ages ranging from 33,000 yr in the upper limit to 49,000 yr in the lower limit, while the ash of new caves has an age of 0.34 - 0.28 m.y. The age determinations of these samples indicate that the volcanic activity in eastern Datong ceased early, while in western Datong it lasted longer, up to more than 100,000 years ago. These results are in close agreement with the conclusion given by Professor YIN Zanxun [1438 6363 0534] (1976).

AUTHOR: CHEN Meng'e [7115 1322 5458]
CHEN Yiyuan [7115 2011 0337]

ORG: CHEN Meng'e of the Institute of Geology, Chinese Academy of Sciences; CHEN Yiyuan of Wuhan Geological College

TITLE: "Note on Possible Coprolites from the Lowest Cambrian Strata of the Changjiang Gorge"

SOURCE: Beijing DIZHI KEXUE [SCIENTIA GEOLOGICA SINICA] in Chinese No 4, 1980 pp 406-407

TEXT OF ENGLISH ABSTRACT: The paper describes a kind of possible coprolites from lowest Cambrian (equivalent to the Tommotian stage) strata, the Tian-Zhu-Shan member of the Dengying Formation of the Changjiang Gorge. These fossils are small (length about 1 mm), conically or intestinally convoluted and irregularly curved in structure, gray and smooth. The original constitution of these fossils is unknown, but now they are made up of phosphate. This coprolite evidently is derived from a coelomate. Therefore, it is suggested that the convoluted-form coprolite appeared in ancient strata along with the ellipsoid-form coprolite. This fact is of not only paleontological, but also sedimentological significance.

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Oceanology and Limnology

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TITLE: "The Influence of Environmental Salinity on the Prolactin and Gonadotropin Secretory Regions in the Pituitary of Trachidermus fasciatus"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 4, Oct 80 pp 314-319

TEXT OF ENGLISH ABSTRACT: Trachidermus fasciatus is a kind of catadromous fish in China. In order to study the reasons for its seaward propagation, comparative study of the pituitaries of this fish collected from both freshwater and seawater (salinity 30-32 percent) in the breeding season was done from 1978 to 1979. The volumetric and histological changes in the rostral and proximal pars distalis of their pituitaries are now described as follows.

In the environment of different salinities, the most pronounced changes occurred in the size of the rostral pars distalis and proximal pars distalis of the pituitaries. The rostral pars distalis, in which the main component is the prolactin secretory region, occupies 33.52 percent of the adenohypophysis in the fish collected from freshwater, and this percentage drops to 19.48 percent in those collected from seawater. The volumetric change of the proximal pars distalis is the inverse of that of the rostral pars distalis. The proximal pars distalis, which contains the gonadotropin secretory region, occupies 48.10 percent of the adenohypophysis in the fish collected from freshwater and goes up to 58.04 percent in those collected from seawater.

[Continuation of HAIYANG YU HUZHAO Vol 11 No 4, Oct 80 pp 314-319]

Histological study of the prolactin cells in the rostral pars distalis shows evidence of the relation between the reduction in environmental salinity and the increase in cellular activity. The acidophilic prolactin cells are oval and highly granular. The cells attach to each other and do not exhibit definite boundaries. The prolactin cells of the fish collected from seawater show signs of involution. The size of the cells becomes smaller and the number of secretory granules decreases. The boundaries of the cells are clearly defined. Prolactin is an anti-gonadotropin agent. Therefore, in the fish collected from freshwater, the basophilic gonadotropic cells in the proximal pars distalis are smaller and the secretory granules of the cells are few, while in the fish collected from seawater the gonadotropic cells become larger and the number of secretory granules of the cells increases. This phenomenon illustrates that the increase of the environmental salinity can retard the secretion of prolactin cells and then improve the secretion of gonadotropic cells. Perhaps this is the reason for the infertility of Trachidermus fasciatus confined to freshwater. Therefore, Trachidermus fasciatus must migrate to the sea to spawn.

AUTHOR: LI Renzhi [2621 4771 5365]
CONG Renyi [0654 0088 5030]
MENG Zhaocai [1322 2507 2008]

ORG: All of the Institute of Oceanology, Chinese Academy of Sciences

TITLE: "On the Absorption of Ammonium Nitrogen by Porphyra yezoensis Ueda. I. The Effects of N-Concentration and Aeration on the Rate of Absorption"

SOURCE: Beijing HAIYANG YU HUZHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 11 No 4, Oct 80 pp 358-361

TEXT OF ENGLISH ABSTRACT: An investigation on the absorption of ammonium nitrogen under low concentration (ranging from 100 μg/l to 1500 μg/l) by using the intact frond of Porphyra as experimental material has been carried out. The results concerning the effect of N-concentration and aeration on the rate of absorption and the time course are summarized as follows.

Twenty fronds of laver can exhaust ammonium nitrogen in a medium (400 ml) with a concentration of 300 μg/l in about two hours. The results indicate that the absorption ability of Porphyra is rather strong. The rate of absorption remained unchanged during the first 90 minutes. This suggests that the changing of concentration seems to have no effect on the rate of absorption.

[Continuation of HAIYANG YU HUZHAO Vol 11 No 4, Oct 80 pp 358-361]

In a strongly aerated medium, the absorption plateau appeared in about 200 μg/l, whereas in weakly or non-aerated media the plateaus appeared in rather high concentrations. The heights of plateaus of different aerated media are more or less similar. These results suggest that aeration plays a stirring role which increases the chance of contact between the NH_4^+ ions and the surface of Porphyra.

It is concluded that the absorption of ammonium nitrogen by frond is an active absorption process.

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TITLE: "Characteristics of the Activity of the Xianshui River Fault"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80 pp 5-6

ABSTRACT: The Xianshui River fault runs roughly northwest and southeast, intersecting a number of other faults. The fault surface is generally inclined toward the northeast, with an angle of 60-80 degrees. There is a fracture zone of about 20-300 meters in width. A network of 7 stations distributed on both sides of the fault was set up and vertical and horizontal position readings taken starting in 1973-74. Measurements taken following the 1973 Luhuo earthquake indicate that the block southwest of the fault is sinking and that northeast of the fault rising. But movement is not uniform, and measurements presented show that the Luhou area is one of high activity (energy release). The area to the south of Daofu station shows little activity, indicating that stress is likely to be building up. Similar results are found for horizontal displacement. If the fault activity area does not extend further to the southeast, Daofu and points south may become an earthquake danger zone. Topographic observation must be stepped up in this region and in an area north of Dandu.

AUTHOR: WANG Ligong [3769 4539 0501]

ORG: None

TITLE: "Disruption of Underground Water Sources by Large Earthquakes"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80 pp 7-8

ABSTRACT: In the aftermath of the Haicheng earthwauke of 4 February 1975, many underground water sources dried up and it was necessary for the Liaoning Province No 2 Hydrogeological Brigade to drill many emergency wells 50-130 meters deep to supply the populace with drinking and irrigation water. Analysis shows that the aquifers were generally shallow schist, slate and granite which was fissured by weathering; earthquake activity produced deeper, more extensive cracking, which allowed the water level to fall as the subsurface water moved deeper into the rock. Similar phenomena occurred in the San Fernando earthquake of 9 February 1971. The problem can be expected to be severe where earthquake structure is associated with the presence of shallow aquifers on a watershed slope, where further fissuring can have a particularly strong effect.

AUTHOR: JING Beike [2529 0554 4430]

ORG: None

TITLE: "Shifts in the Foci of Strong Earthquakes"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80 pp 10-11, 18

ABSTRACT: Movement of the foci of successive earthquakes was plotted against time in three major earthquake belts in China: the Qilingshan-Liupanshan Fold System Earthquake Belt, the North-South Earthquake Belt and the Shanxi Uplift Region Subsidence Earthquake Belt. In all cases, significant linear plots were obtained. In the case of the North-South Belt, a reversal of the direction of shifting of the earthquake foci was noted in the late 1960's; in the case of the Shanxi Uplift Region belt two separate shift patterns occurring simultaneously were identified. The blocks at whose junctions earthquakes occur turn relative to one another, and when an earthquake on one section of the junction produces fracturing, the section where accumulated stress exists to be released in an earthquake moves down the junction.

AUTHOR: GAO Jizong [7559 4949 1350]

ORG: None

TITLE: "Geothermal Anomalies"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80 pp 12-13, 20

ABSTRACT: Regions in which the ground temperature gradient or the heat flux density are higher (or lower) than average are geothermal anomalies. These areas tend to be associated with earthquake zones worldwide, and in China (Taiwan hot springs areas, Tibet and Yunnan in the Mediterranean-Himalaya belt). The principal reason is that faulting associated with earthquakes also provides passages for upward movement of heat from the deeper regions of the earth. A table showing earthquake frequencies for 3 geothermal fields in China is presented. Eight geothermal phenomena associated with earthquakes are identified: appearance of warm springs, increasing temperature of warm springs, sudden changes in ground temperature, issuing of steam from the ground, hot steam geysers from holes and fissures, issuing of sulfur-containing gases form the ground, water- or steam-related "explosions," and local climatic warming.

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Li Jinquan [2621 6855 2164], ZHANG Tianqing [1728 1131 1987]

ORG: None

TITLE: "Changes in Oil Well Output Related to Earthquakes"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80
pp 17-18

ABSTRACT: Before the 9 June 1979 Bohai earthquake (magnitude 4.0), an increase in oil output from well No S-265 in the vicinity of the earthquake area had been noticed. Thereafter, output of this well was monitored carefully, and another sudden increase in output was noted on 29 June, which was followed by another earthquake of magnitude 4.0 the following day. In both cases the jump in production was pronounced, in one case increasing from about 40 to about 80 tons per day in the course of 2 days (output had been abnormally low--15 tons a day--rather more than a week before), and on the second occasion rising from the vicinity of 50 tons a day to 75 and 78 tons a day in the course of 2 days. In the Shengli oilfield, two wells (Nos S-513 and S-111) also showed extremely large jumps in output a few days before the 1976 Tangshan earthquake.

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ORG: None

TITLE: "Earthquakes and Changes in Gases in Underground Water"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80
pp 21-22, 45

ABSTRACT: Gases dissolved in water were measured in a number of wells starting in 1974. Initially a chemical adsorption method was used to determine total gases, carbon dioxide and oxygen; starting in November 1975 the gas chromatographic method was used to determine carbon dioxide, oxygen, nitrogen, methane and total gases. Pronounced changes in total gas content in the water of the Mian No 4 well were found starting in January 1976, presumably associated with the August 1976 Tangshan earthquake. The Jing No 2 well showed changes in carbon dioxide and total gases which may have been associated with the 15 November 1976 and 12 May 1977 Ninghe earthquakes, but it is important to recognize the factors which can cause fluctuation in the readings and render the data invalid. Three of these factors are considered: changes in sampling conditions (in particular changes in the depth from which the sample is pumped), temperature at which the gases are extracted (i.e. in colder in situ conditions or in warmer laboratory conditions), and variations in the efficiency of extraction of the gases from the water.

AUTHOR: WU Shuqi [0702 2885 3823]

ORG: None

TITLE: "Trends in Earthquake Prediction Research"

SOURCE: Beijing DIZHEN ZHANXIAN [SEISMOLOGY FRONT] in Chinese No 2, 26 Mar 80 pp 43-45; adapted from KAGAKU [SCIENCE] in Japanese No 5, 1979

Abstract: In recent years there has been considerable progress in long-term earthquake forecasting, but less progress has been made in the important areas of mid-term and short-term forecasting. An important contribution to earthquake theory has been the dilatancy theory, which holds that before earthquakes small fractures appear in rock, causing it to expand, after which water enters the fissures, ultimately leading to failure and an earthquake. This theory explains phenomena such as ground swelling, the speed of earthquake waves, radon content of subsurface water and electrical resistivity changes, but it has failed to square with more recent data. However, it has had the beneficial effect of focusing attention on a number of factors that previously had received insufficient attention. Detailed measurement of microseisms is very important because it gives detailed information on the speeds of propagation of seismic waves at different points and makes possible 3-dimensional structural diagrams which can be used in earthquake prediction, especially for the recognition of foreshocks. A block diagram showing the interrelations of various areas of earthquake prediction is presented; fault modeling, microseism data and investigation of the causes of stress accumulation are the basis of a better knowledge of foreshocks and thus can contribute to short term prediction.

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AUTHOR: SUN Xinhua [1327 2450 5478]

ORG: None

TITLE: "Braving Wind and Waves on a Journey to the Distant Horizon"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, 1980 pp 2-3

ABSTRACT: As part of a Chinese delivery rocket test, a convoy of 18 ships made a 35-day, 10,000-mile cruise to the target area in the South Pacific. The 18 ships included guided missile destroyer No 131, Xiangyanghong No 5, Yuanwang No 1 and ship No 107, as well as an oil and water ship. The force was seen off in late April by Wang Zhen, Geng Biao and other civil and military dignitaries. A refueling operation was carried out en route. Other countries sent ships and aircraft to observe the results of the missile test, and the task force had to warn these out of the impact area in a peaceable manner. The instrument package ejected when the missile nose cone fell into the sea was recovered by a diver descending from a helicopter. The returning force was inspected by Ye Jianying and Zhang Aiping, and later command personnel were present in Beijing at a celebration of the successful test, attended by Hua Guofeng, Deng Xiaoping, Li Xiannian and Chen Yunfu.

AUTHOR: HAI Liu [3189 3177]

ORG: None

TITLE: "A 'Secret Weapon' and the Defense Against It"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, 1980 pp 12-13

ABSTRACT: Hitler's attempt to cut England's commercial lifeline in World War II took first the form of submarine warfare, then that of mining territorial waters with a new type of mine, the magnetic induction mine. These mines took a heavy toll until British scientists were able to obtain and analyze one. Since these mines were detonated by the magnetism of ship hulls, there were two ways of combat them: to detonate them by generating strong magnetic fields, and to demagnetize ship hulls. Hull demagnetization was first done by equipping the ships with a loop of wire through which current could be passed. This took up virtually all the British wire output. Later it was found that hulls could be demagnetized by passing a loop of wire around them, passing a strong pulse of current through the wire, then removing it; the demagnetization had to be repeated periodically. Demagnetization was especially important for smaller ships, and it had a critical impact on the war effort, since the evacuation from Dunkirk was done largely with small craft.

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LASER DELEGATION'S IMPRESSIONS DURING U.S. VISIT RECOUNTED

Shanghai JIGUANG in Chinese Vol 6, No 11, Nov 79 signed to press 25 Aug 79 pp 51-55

[Article by Wang Zhijiang [3769 0037 3068], Shanghai Institute of Optics and Precision Instruments, Chinese Academy of Sciences, and Zhang Zhiming [4545 1807 7686], Department of Physics, Fudan University: "Impressions on Lasers in Visit to the United States"]

[Text] In early summer of 1979, the Instrument Society of China, on the invitation of the U.S. Institute of Electrical and Electronics Engineers (IEEE) and the Optical Society of America (OSA), formed a laser delegation to attend the 7th Conference on Laser Engineering and Applications (CLEA), held in Washington, capital of the United States. The delegation consisted of several comrades concerned with laser research, education, production, and administration, and affiliated with the Academy of Sciences, Ministry of Education, First Ministry of Machine Building, and Fifth Ministry of Machine Building. CLEA was held for 3 days, from 30 May through 1 June 1979. While the conference was in session they also held a laser exhibition. After the conference, from 2 through 17 June, the delegation visited seven universities (Massachusetts Institute of Technology, University of Rochester, Stanford University, University of California at Berkeley, University of Southern California, University of Arizona, and University of California at San Diego), four laser institutes or research laboratories (Bell Laboratories, KMS Fusion Incorporated, Ford Motor Company Research Laboratory, and University of California Lawrence Livermore Laboratory), four plants specializing in laser devices (Avco Corporation, Spectra-Physics Inc., Coherent Inc., and Hughes Aircraft Co.), and four units developing laser applications (General Motors, Saint Nadick Audio Visual Service, Polaroid Corporation, and Sinai Hospital). Although these are just a small sample of the units, they reflect the general situation of the United States in laser research, production, and applications. Furthermore, since attending CLEA, we have come to understand some current trends and achievements in laser engineering and applications. Due to limitations of time and depth, our impressions are bound to have one-sided and even erroneous points.

The Conference on Laser Engineering and Applications is held once every 2 years (alternating with the International Conference on Quantum Electronics). The participants are mainly American scientists but Western European, Japanese, Soviet, and Eastern European scientists also usually attend, so it is indeed international. This was the first time attended the conference. The conference was divided into group sessions for papers and reports under 16 topics, and 201 papers were read. The conference was held in three conference halls simultaneously and it lasted for 3 whole days and an evening. The topics of the sessions were: (1) Materials Processing, Biomedical and Other Novel Applications; (2) Tunable Filters, Modulators and Detectors; (3) Remote Sensing; (4) Laser Isotope Separation and Photochemistry; (5) Spectroscopy and Nonlinear Optics; (6) Adaptive Optics, Actuating Sensors and Radar; (7) Laser Annealing and Materials Processing; (8) Optical Communications (two sessions); (9) Excimer Lasers; (10) Laser Fusion (two sessions); (11) Optical Phase Conjugation Technology; (12) Infrared Lasers; (13) Tunable Lasers; (14) Optically Pumped and Short Pulse Lasers; (15) Optical Recording and Signal Processing; and (16) Bistable Devices and Other Applications. From the subject matter above, it can be seen that the scope covered by the papers was extremely broad. However, looking at it overall, it dealt with basic research on laser engineering and applications including research on laser devices, without being a rehash of already familiar laser applications.

There were 63 companies participating at an exhibition held concurrently with the conference. The products exhibited were mainly laser devices and components, laser measuring and testing instruments, optical components, and optoelectronic detectors.

Two award reports were presented during the conference. One was the 1979 Charnod Award to G. Fox and Dr Li Tingyi [0632 7844 3015] (Tingye Li) for the "discovery of the open-structured mode and its application in laser resonators." The other was the 1979 M. Liebermann Award to Dr Tian Binggeng [3944 3521 5087] (P.K. Tien) for "contributions to integrated optics technology." The three award winners were all researchers at Bell Laboratories and of those, two were scholars of Chinese descent.

Comrade Wang Zhijiang [3769 0037 3068] of the Chinese delegation also presented a paper at the conference, "China's Laser Science and Technology." Though the paper had arrived past the due date, it was assigned major importance, stood as a special invited paper, and was announced many times in advance. During the report many foreign scholars and nearly all the scholars of Chinese descent were present. Everybody expressed surprise and admiration at the many types of lasers already developed, the applied research, and the development of laser fusion in China presented in the report. After the report was finished, many scholars and conference attendees came up to offer congratulations.

During the entire course of our visit we were greeted with full warmth and friendship by the American scientists and we were deeply impressed by the depth and breadth of America's laser science and technology. We will now take up the items separately.

Sessions on laser devices included excimer, infrared, tunable, optically-pumped, and short-pulse lasers. Avco Corporation reported obtaining a 1-microsecond pulse, 10 percent efficiency, and an output of 12 joules/liter in a KrF* and XeF* laser. The Max Planck Laser Institute of West Germany obtained a laser output of 285 nanometers in the ultraviolet with the new ClF* in a halogen-family gas mixture of Cl_2 and F_2. During our visit we saw that many universities and research organizations were expanding their research in the excimer laser such as studying the process and mechanism of excitation reactions, and raising the output efficiency of the laser. This is because it has practical value in many areas.

In infrared lasers, some people reported research results for a TEA CO_2 minilaser. Japan reported on the operating conditions of a 1.5-kilowatt high-pressure continuous-wave CO_2 laser. The various universities we visited had many units devoted to submillimeter lasers and tunable lasers in the infrared waveband. Considerable attention was also directed to research on detectors in this waveband. There was also much interest in the miniaturization of various types of CO_2 lasers.

The emphasis in tunable dye lasers was in research on how to obtain a frequency-stabilized laser output. Coherent Inc. reported on a ring dye laser that could obtain a 3-watt single-frequency output with a frequency at 0.2 megahertz and a tunable range of 300 gigahertz. Spectra-Physics Inc. reported on a relationship between frequency stability, length stability, and intracavity power by synchronous pumping. In the laser laboratories we saw, dye lasers were perhaps the most common tool, generally attaining monochromaticity at the megahertz level. In a report presented by the U.S. Bureau of Standards, a linewidth of less than 2 kilohertz was attained.

Other tunable color center lasers also attracted notice such as KF and F_2^+ color center lasers with a continuous output which could attain 2 watts and a tunable range of 0.8 - 1.5 microns. A method has now been devised with a high-quality convenient low-temperature container to preserve the crystal and efficient conversion of the F_2 color center to an F_2^+ color center by photoionization. Therefore, color center lasers have become popular and commercially available. There are also tunable infrared lasers similar to these using transition element (such as Ni, Cr, Co, V) activated crystals.

Optically pumped lasers included an Se laser with an output of 4 joules/liter at 4890 angstroms, formed by the photodissociation of OCSe gas. An alkali metal laser was formed by the photodissociation of alkali-halide vapor. It was a minilaser with a peak power of 100 kilowatts that could obtain a high repetition rate in the 3800 - 9000 angstrom band. For miniaturized optically pumped crystals, besides neodymium pentaphosphate, neodymium-lanthanum pentaphosphate was also developed that could be used in minilasers with total dimensions of 6" x 3" x 3" including the flashlamp and energy source. Regarding short pulse technology, one could take note of using stimulated Raman back-scattering for pulse-compression technology. Livermore Laboratory thought that Raman compression by a KrF laser would be the optimal candidate for laser fusion.

Fiberoptic communications has entered the stage of engineering applications. Its potential possibilities for future development arouse even greater interest. A conference on this subject held by the Optical Society of America in early May 1979, drew almost 900 attendees which exceeded expectations. They discussed various problems from basic research to engineering applications. The two sessions at CLEA were of a trailblazing nature. The first session concentrated on semiconductor laser light-sources operating with a single-mode output at room temperature. Most of these light sources were multielement heterojunction structures on a binary base such as $In_{1-x}Ga_xAs_yP_{1-y}$/InP or $Al_xGa_{1-x}As_ySb_{1-y}$/GaSb with output wavelengths at 1.2 to 1.5 microns, threshhold currents of 3.5 - 5 milliamperes/cm^2, and lifetimes of over 10,000 hours. MIT's Lincoln Laboratory reported on obtaining a continuous single-mode output in an external resonator, with a frequency drift of less than 5 megahertz/minute. It was expected that after mode-locking of an F-P etalon, it could be less than 1 megahertz. The Nippon Telegraph and Telephone Corporation described the current status of optical communications in the 1 micron region. It was thought that present fiber attenuation had amounted to 0.5 decibels per kilometer at 1.2 microns, 0.5 decibels per kilometer in single mode and 0.34 decibels per kilometer in multimode at 1.3 microns, and 0.2 decibels per kilometer in single mode at 1.5 microns. In addition, at 1.3 microns it was nearly equal to the null chromatic dispersion of quartz material, and therefore the broadening caused by pulse transmission in single-mode fiber was very slight. Next was a four-element semiconductor laser with a high modulating capability, a wavelength that could cover 1.0 - 1.4 microns and a germanium avalanche diode with a fast response and a wavelength sensitivity up to 1.6 microns. Therefore it was thought that performance studies of communications systems could be conducted at longer wavelengths in the future. The other session concentrated on integrated optics and studies of individual components such as the mechanism of loss in lithium niobate waveguides, transmissivity measurements of optical fiber, and loss-free measurements of the refractive index profile.

It can be seen that the train of thought of the research was wide open and was not limited by progress already made or reduced to narrow technological research but was work with far-reaching efforts. It was both in the forefront and in depth.

The two sessions on fusion included achievements and plans in laser fusion from Japan, West Germany, England, and the Lawrence Livermore Laboratory, Los Alamos Laboratory, and Laboratory for Laser Energetics of the University of Rochester in the United States. For example, the Institute of Laser Engineering of the University of Osaka presented their Gekko IV four-beam 4-terawatt glass laser, and West Germany the Asterix 1-terawatt iodine laser. After the conference we visited three laboratories involved and we were even more deeply impressed with the development of neodymium glass lasers and the progress made by the fusion laboratories. By using space filters as the relay system and by cleaning the primary oscillation amplifier section, the wavefront uniformity was raised further and the power load of the device was raised 50 percent. The automatic adjustment and alignment system for the optical pathlength and the stability of the supports were successful. This large-scale 20-arm experimental device has already become a normally functioning tool. The KMS device will use shaped pulses.

The target is an important part of fusion research. It is essential for thoroughly understanding the fusion processes in experiments and for comparing the experiment with the theory. Therefore several major laboratories have devoted great effort to the manufacture and testing of targets so they could produce such targets as multilayer or low-temperature of the required quality.

In 18 months of operation from late 1977 to March 1979, the Shiva attained compression to a liquid density of 100 times (30 grams/cm^3).

The session on laser isotope separation which received considerable attention for its present applications, had 18 reports. The Lawrence Livermore Laboratory used a multiphoton absorption (MPA) method to separate deuterium. They used a CO_2 laser with a pulsewidth of 2 or 100 nanoseconds and an energy density of 10 - 20 joules/cm^2. The working system selected was Freon 123 (CF_3CDCl_2), trifluoromethane (CDF_3) and methyl acetylene ($D - C \equiv C - CH_3$). Its enrichment factor showed consistently good results, and they analyzed the conditions in which laser isotope separation would have valuable commercial applications. The U.S. Naval Research Laboratory suggested using a continuous-wave CO_2 laser for a nonresonant pumping method in which methane (CH_4) and CH_3D were separated by the principle of selective energy transfer from some sensitized molecules to the isotopes.

Though laser hot-working was used early in industry, recently there has again been progress. One thing is the use of high-power lasers to apply anti-corrosive layers to metal surfaces. Another is laser annealing of semiconductor surface defects. The latter is especially well-considered due to its excellent effect on the quality of the semiconductor. Laser annealing was performed on defects caused by ion-implanted dopants in the surface of semiconductor silicon. The lasers used were a 1.06-micron continuous-wave YAG and a continuous-wave CO_2 laser with powers of 20 to 30 watts. A pulsed KrF laser was also used. Laser annealing of a 1000-angstrom-thick amorphous silicon film could be accomplished in several milliseconds. This was a solid-phase epitaxial renewal process and there was no damage at all to the silicon single-crystal material of the substrate. The dopant concentration could be $10^{12} - 10^{15}$ cm^{-2}. The electron microscope confirmed that an excellent single-crystal film had been formed. Another laser applied research was the use of laser photodissociation of organometallic compounds to separate out metal films. The film could presently be several microns thick with sheer sides. The system used was dimethyl cadmium [$Cd(CH_3)_2$], tetramethyl tin [$Sn(CH_3)_4$], and trifluormethane monoiodide (CF_3I). The lasers used were excimer or argon-ion in the ultraviolet. They also used a CO_2 laser. Its mechanism was not photodissociative but thermodissociative. By focusing a CO_2 laser beam on a substrate in a tetracarbonyl nickel [$Ni(CO)_4$] atmosphere, they could separate out nickel films. Hopefully these studies on new processing methods may have applications in the processing of semiconductors and mini devices for integrated optics.

In addition it is worth mentioning two types of applications at the conference which have not been reported much. One was an optical gyroscope which uses differences in passive position-finding and large-area circuits formed by fiber optics. It is sure to see further progress. The other type of application was laser recording and display which serve as computer output equipment. They have become objects of competition for several companies. The home videodisk has already become commercial. It should become the largest market for lasers. A videodisk running for 30 to 60 minutes on one side sells for 6 to 16 U.S. dollars and serves as a low-cost means for high-density information storage. It seems to have a very promising future and its function is certainly not just to provide home entertainment.

Finally, we should say something about our impressions of basic research in the United States. In general it seems that the United States regards basic research as very important. Applied research is mostly conducted in factory laboratories but basic research is conducted in universities or laboratories of certain large enterprises. For example, the Ford Motor Company Research Laboratory has promoted research on the highly excited fine structure of the hydrogen atom spectrum. According to our understanding, in prominent research organizations such as the Ford Motor Company Research Laboratory and Bell Laboratories, the selection of research problems is determined completely by the research personnel themselves. The company just requires that a certain number of papers be published in the journals every year. Actually however, since there is a place for guidance, the problems selected by these research groups generally revolve around specific goals. For example, the Ford Motor Company's laser efforts are all concerned with detecting combustion and air pollution, and the Bell Laboratories are devoted to research on more advanced optical communications including obtaining laser sources with new wavebands and the transmissivity of those bands. This illustrates that the leaders of scientific research can effectively regulate the relationship of the initiative of the scientific research personnel with the general goals. As for the universities, the selection of research problems is of course freer than in some research institutes and may involve broader areas but it is restricted by the research funds requested for research organizations by the U.S. National Science Foundation, Department of Energy, and the three military services. The high regard by these organizations for basic research has promoted the development of science and has promoted the emergence of creative work.

Some of the basic research described above already has a clear applications goal-orientation or can be assumed to have a long-range applications goal-orientation. Such work is easy to support but it is certainly not the most basic research. It is called pay-off development in the United States. Yet basic research is research with no immediately visible practical value. Laser research in U.S. university physics departments is mostly of this character. They consider lasers a tool to develop laser spectroscopy and nonlinear optics, to develop thoroughly the physical properties or physicochemical processes of matter, or to verify the validity of physical laws. Many spectroscopic methods to eliminate Doppler broadening, already developed in the past, have been widely used to study the fine structure of atomic spectra such as the spectrum of the hydrogen atom and the spectra of highly excited states. Since there is such a tool as the picosecond pulsed laser, it can be used to study fast processes. The advantage of coherent anti-Stokes Raman spectroscopy (CARS), especially the high sensitivity of polarized CARS is it can be used to study many physical processes such as relaxation processes and phonons in liquid crystals. How to use optical methods to verify the validity of the theory of relativity or to verify the parity of weak interactions has attracted the attention of physicists even more.

American laboratory equipment is well advanced in all aspects of testing and measuring instruments. All kinds of signal processing and analysis, and computer and microprocessor applications are also widespread. Some laboratories also make some lasers themselves but generally speaking, all of them purchase finished products. In present-day American laboratories, hydrogen-ion-pumped tunable dye lasers are very widespread because to conduct research on laser physics, it is an indispensable tool.

In our visit, we found that there is always good mutual understanding among foreign scientists, exchange of materials among them is also very frequent, scientific thought is lively, and the appearance of new ideas and new methods gets encouragement and respect. There is something here worth drawing a lesson from.

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ORG: HUANG, DENG, LI, WU of Virology, Chinese Academy of Medical Sciences; JIA of Hebei Provincial Institute of Epidemiology

TITLE: "Successful Immunization of Infants With Maternal Measles Antibodies by Partially attenuated Measles Vaccine"

SOURCE: Beijing LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol 1 No 3, Aug 80 pp 131-135

ABSTRACT: At present, the targets of immunization with attenuated live measles vaccine are children of more than 8-month of age; therefore, there is no way to eliminate the existence of infants susceptible to measles, while the mortality rate of measles is high among infants less than one year of age. This paper reports an experimental program of hypodermic injection of 1,000-3,000TCID$_{50}$ in 4 infants with low level of maternal measles antibodies (1:1 - 1:2). Immunization of these infants was successfully obtained. Whether the success is related to the hypodermic pathway, the low level of antibodies, or the large dosage of vaccine, or some other reasons remains a subject to be clarified in the future. These problems are extensively discussed in the paper.

AUTHOR: None

ORG: Xiacheng District Public Health and Epidemic Prevention Station, Hangzhou; Infectious Disease Research Office, Zhejiang University of Medicine

TITLE: "Studies on the Characteristics of Occurrence of Post Vaccinal Measles and the Immune Status After Mass Inoculation With Live Measles Vaccine"

SOURCE: Beijing LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol 1 No 3, Aug 80 pp 136-139

ABSTRACT: Ever since the mass inoculation of attenuated live measles vaccine, the regularity of periodical epidemic of measles has changed. The incidence and mortality rate have dropped in a large scale, and the age of measles incidence has become older. According to reports of various regions of late, there has been some increase of mild cases, however. For the purpose of understanding the prolonged immune effects of measles vaccine and the clinical characteristics of post-inoculation cases, measles epidemiological data before and after the mass inoculation in Xiacheng District are compared; samples are taken to determine the antibody level of students of middle and elementary schools; measles patients and those who have contact with them are examined to determine their serum antibodies. Results of these studies are reported.

AUTHOR: None

ORG: Linyi County Epidemic Prevention Station, Shandong Province

TITLE: "A Survey Report on the Abnormal Reactions of Neurological System After Inoculation With Rabies Vaccine"

SOURCE: Beijing LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol 1 No 3, Aug 80 pp 143-145

ABSTRACT: Since Jun 78, the authors have applied rabies vaccine to 1107 victims of bites of rabid dogs. Of the group, abnormal reactions of the neurological system occurred to nine and one of these died. The rate of occurrence of abnormal reactions amounted to 0.81 percent. Vaccines of 3 manufacturers of Changchun, Wuhan, and Lanzhou were used, and incidence of abnormal reactions to the vaccines was 0.89 (4/450), 0.79 (4/507), and 0.67 (1/150) respectively. The clinical manifestations, the laboratory data, and the treatment and recovery processes of the cases of abnormal reactions are reviewed. These reactions are generally believed to be a form of allergic response of the nervous system. Histories of 3 such cases are included to illustrate these reactions.

AUTHOR: None

ORG: Guizhou Provincial Public Health and Epidemic Prevention Station; Guiyang Municipal Public Health and Epidemic Prevention Stations; Zunyi District Public Health and Epidemic Prevention Station; Anshun District Public Health and Epidemic Prevention Station; Guiyang City Fangshi District Public Health and Epidemic Prevention Station; Zunyi City Public Health and Epidemic Prevention Station; Anshun City Public Health and Epidemic Prevention Station

TITLE: "Characteristics of New A_1 Influenza Epidemic of 1977 in Guizhou Province"

SOURCE: Beijing LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol No 3, Aug 80 pp 146-148

ABSTRACT: In Sep-Oct 77, an intermediate degree epidemic of the new A_1 type influenza appeared all over Guizhou Province involving 75 counties and cities. There were 544.8 cases in every one hundred thousand persons. It is believed that the mutation of the influenza virus is related to the increased rate of incidence. The disease spread very fast, attacking mainly young persons under 20 years of age. The clinical symptoms were mild and there were very few fatalities. This strain of influenza virus was first discovered in the beginning of Sep and within 10 days many schools in the central areas of the province had to be closed due to the epidemic. In 2 months' time 75 of the 84 cities (counties) of the province were seized by the epidemic.

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CSO: 4009

AUTHOR: LIN Wei [2651 0251]
WU Ciqian [0702 5417 3383]

ORG: LIN of the Department of Mathematics and Mechanics; WU of the Department of Computer Science

TITLE: "The Third Characteristic Problem for the Systems of Hyperbolic Equations"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 1-14

TEXT OF ENGLISH ABSTRACT: What we call the third characteristic problem for the system of the hyperbolic equations

$$\left[\begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}\frac{\partial^2}{\partial x^2} + 2\begin{pmatrix} b_1 & 1 \\ b_2 & b_1 \end{pmatrix}\frac{\partial^2}{\partial x \partial y} + \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}\frac{\partial^2}{\partial y^2}\right]\begin{pmatrix} u \\ v \end{pmatrix} = 0 \qquad (H_1)$$

$$b_2 = b_1^2 - \frac{1}{2}\left(k + \frac{1}{k}\right)b_1 + \frac{1}{4} \neq 0, \qquad b_1 \neq 0, \quad 0 < k < 1,$$

is to look for the unknown functions u, v, satisfying the characteristic conditions

$$u|_{l_i} = \varphi_i(x), \quad v|_{l_j'} = \phi(x), \quad l_j' \neq l_i \quad i = 1,2,3$$

or

$$u|_{l_i} = \varphi_i(x), \quad v|_{l_j'} = \phi(x), \quad l_i \neq l_j' \quad i,j = 1,2$$

[Continuation of ZHONGSHAN DAXUE XUEBAO No 3, Aug 80 pp 1-14]

where l_i, l_j are four characteristic lines of (H_1). The sufficient and necessary conditions for the uniqueness of the third characteristic problem, as we know, is still left open.

In this paper we completely solve the above-mentioned problem, and also find out all trivial solutions for (H_1).

AUTHOR: HUANG Youqian [7806 0645 6197]

ORG: Department of Computer Science

TITLE: "Error Estimations for Smoothing Functions"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 15-22

TEXT OF ENGLISH ABSTRACT: In this paper, error estimations on the derivatives of finite orders for continuous and discrete forms of smoothing functions are given.

AUTHOR: XIE Pingmin [6200 1627 3046]

ORG: Department of Mathematics and Mechanics

TITLE: "On Mean Square Convergence of a Stochastic Riemann Sum"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 23-28

TEXT OF ENGLISH ABSTRACT: This paper discusses mean square convergence of a stochastic Riemann sum and its application in the stochastic integral.

AUTHOR: DAI Yonglong [2071 3057 7127]

ORG: Department of Mathematics and Mechanics

TITLE: "On Markov Chains with a Potential"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 29-34

TEXT OF ENGLISH ABSTRACT: Let E be a finite or countable infinite set, and $A = (a_{ij}, i, j \in E)$ be a real value matrix which satisfies the following conditions:

1) If $i \neq j$ and $i, j \in E$, then $a_{ij} \geqslant 0$

2) $a_{ij} > 0 \Rightarrow a_{ij} > 0 \quad i, j \in E$

when $a_{ij} > 0$, we let

$$\varphi_{ij} = \log \frac{a_{ji}}{a_{ij}}$$

The real number sequence $(u_i, i \in E)$ is called the potential of A if it satisfies the following condition:

$$u_j - u_i = \varphi_{ij}.$$

In this paper we present two notes on the matrix with a potential, and then apply them to a Markov chain and Q-matrix, thus obtaining the general form of a Markov chain and Q-matrix with a potential.

AUTHOR: SHI Longpei [0670 7127 1014]
CHEN Qizhou [7115 0796 3166]

ORG: Both of the Department of Physics

TITLE: "The Nonlinear Effects of the Ising Model in a Transverse Field"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 35-44

TEXT OF ENGLISH ABSTRACT: In this paper we apply the method of the n+1 time Green function in analyzing the linear and nonlinear effects of the longitudinal polarization process of the ising model in a transverse field. The linear and nonlinear polarizabilities and detection, mixing frequency, multiplying frequency and effects were obtained. The relationships between these effects and the tunneling integration, interaction integration, frequency and temperature are explained.

AUTHOR: MO Dang [5459 7825]
CHEN Shuguang [7115 2885 0342]
XU Geng [1776 5087]

ORG: All of the Department of Physics

TITLE: "Dispersion and Ellipsometric Spectrum of Silicon"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 45-48

TEXT OF ENGLISH ABSTRACT: In this paper the influence of silicon dispersion (the relation between the refractive index and the wavelength of light) on the ellipsometric spectrum has been investigated. By measuring the ellipsometric spectra of several samples, each of which is covered with an oxide film, the dispersion curve is determined. The result is compared with data obtained with other methods by Meyer, et al., and by Philipp, et al.

AUTHOR: YAO Jie [1202 2638]
CHEN Baoqiong [7115 1405 8825]

ORG: Both of the Department of Physics

TITLE: "The Properties of $Si-SiO_2$ System Formed by Spun-On Emulsion"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 49-53

TEXT OF ENGLISH ABSTRACT: The relation between the thickness of the spun-on silica films and the spun-on speeds (3200-4800 rev/min) and the method of preventing craze was examined. It was found that the interface fixed positive charge densities (N_{if}) were variable for the different heat treatments and the N_{if} of spin-on $Si-SiO_2$ interface was smaller than the N_{if} of thermally oxidized silicon interface. Good results have been achieved when this technology was applied in the making of surface inversion structure violet sensitive Si photoelectric detectors.

AUTHOR: HUANG Yukun [7806 3768 1507]

ORG: Department of Geology

TITLE: "The Fundamental Characteristics of Crustal Movements Along the Northern Coasts of the South China Sea Since the Neogene"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 54-63

TEXT OF ENGLISH ABSTRACT: This paper discusses some problems of recent crustal movements in this area with various data of the geological, geomorphological, seismic and geodestic fields, and draws conclusions as follows:
1. There are three groups of main faults in this area--NE, NW, EW. They are still active faults and intersect each other, forming a network fracture picture. Most of the strong earthquake epicenters and hot springs occurred along the intersection portion.
2. The broad area of peneplain occurred during the early Tertiary, but it was rejuvenated along the old fault zones in different directions in Neogene. The amplitude of the emergence and submergence was about 5 km. It is still recurrent along the old fault zones.
3. Recent volcanic activity in this area is concentrated in the northern Hainan Island and Leizhou peninsula. It is subdivided into 10 eruptive stages and 58 eruptive cycles.

AUTHOR: DENG Guogan [6772 0948 2413]
LIU Deping [0491 1795 1627]

ORG: Both of the Department of Geology

TITLE: "A Study on the Mineralization Period of Two Strata-Bound Ore Deposits in Guangdong"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 64-68

TEXT OF ENGLISH ABSTRACT: The iron ore of Shilu (Hainan Island) and Jianshan (Pingyuan County) is a sedimentary deposit; they have two ferruginous positions--one is Middle Carboniferous and the other pay sediment is the deposit of early Permian.

The stratum--Shilu Group have seven strata; the first through sixth strata are deposits of Carboniferous and the seventh stratum was formed in the early Permian. The sixth and seventh strata are the ferruginous positions.

Other iron ore deposits in eastern Guangdong, their mineralization period mainly formed in the Middle Carboniferous, perhaps originated from the oceanic volcano.

AUTHOR: None

ORG: Solid State Research Group, High Polymer Chemistry Research Institute

TITLE: "An Investigation on the Structure and Properties of the Modified Polypropylene Materials. I. The Structure and Properties of IPP/LDPE Blend Materials"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 69-77

TEXT OF ENGLISH ABSTRACT: In this article the relationship of the mechanical and physical properties of IPP/LDPE blended systems with the submacro-structure of the material is discussed. It has been found that, as the composition of IPP/LDPE - 70/30 changes into 40/60, the phase inversion occurs. The framework of polypropylene spherulites, as observed between crossed polaroids, first contacts each other and is embedded with LDPE, and finally changes into the fragments of polypropylene in polyethylene. In between, there are crystalline interlinks found among the crystalline fragments of polypropylene. The mechanical and physical properties of IPP/LDPE blended systems are dependent upon the phase state, especially the impact strength.

AUTHOR: CHEN Yongzhao [7115 3057 0340]
XIE Jingming [6200 6975 2494]
CHEN Peiling [7115 0160 3781]
TAN Guanhe [6223 6034 3109]

ORG: All of the Department of Chemistry

TITLE: "The Uses of Masking Agents in Chelometry. IX. The Complexometric Titration of Tin in Tin Concentrate with Lactic Acid as Masking Agent"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 78-82

TEXT OF ENGLISH ABSTRACT: We have found that lactic acid is an effective masking agent for tin (IV), and in the presence of lead, zinc, copper, bismuth, cadmium, nickel, cobalt and antimony, lactic acid can completely displace the EDTA from the tin-EDTA complex. Therefore, we worked out a displacement method for the titration of tin in tin-base or lead-base alloys. In this paper we modified the above method and found that in the titration of 10 mg of tin, not more than 3 mg of iron and 0.3 mg of aluminum (equivalent to 15 percent of iron and 1.2 percent of aluminum in the tin concentrate) did not interfere. We successfully use this method to determine the tin in a tin concentrate (with 52.89 percent tin) and the result is comparable to the iodometric method.

AUTHOR: WANG Bosun [3769 0130 1327]

ORG: Department of Biology

TITLE: "Studies on the Spore Morphology of Schizaeaceae from China"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 87-91

TEXT OF ENGLISH ABSTRACT: This paper deals with the spore morphology of Chinese *Schizaea*. So far, three species are recognized in China, i.e., *Schizaea biroi* Reichter, *S. dichotoma* (L.) Sm. and *S. digitata* (L.) Sw. Of them, *S. dichotoma* is a new record in China.

The spore morphology of Chinese *Schizaea* is a tetragonal tetrad with monolete; the equatorial view is nephroid, or bean-form, or semiorbicular; the polar view is broad-elliptic; NPC 113. However the proximal face view of *Schizaea digitata* is nauti-form under Scanning Electron Microscope.

The spore sexine patterns of *Schizaea digitata* are costate, while others are tuberculate. As the frond of *Schizaea digitata* is grass-form, it bears at the apex an apparently digitate group of fertile; while others are dichotomously branched, with fertile lobes pinnetely arranged at the end of the branch of the frond. Consequently, there is a certain correlation between the spore sexine patterns and the frond branching system of Chinese Schizaea.

[Continuation of ZHONGSHAN DAXUE XUEBAO No 3, Aug 80 pp 87-91]

The modern distributing center of *Schizaea* is located in the tropical and subtropical zone of the southern hemisphere, but the fossil spores of *Schizaea* were found in Late-Triassic and distributed throughout the continent of Eurasia in the Jurassic. Therefore, the distributing center of *Schizaea* is not the original center, and the Chinese *Schizaea* seems not to be derived from that of the Malay Archipelago as was suggested previously by certain authors.

AUTHOR: WANG Bosun [3769 0130 1327]

ORG: Department of Biology

TITLE: "The New Distribution of Ferns in China"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 p 92

TEXT OF ENGLISH ABSTRACT: The discovery of tow ferns for the first time in China, Schizaea dichhotoma (L.) Sm. and Drymoglossum piloselloides (L.) Presl. var. platycerioides Teruya, was made on Hainan Island.

AUTHOR: XU Hao [1776 6275]
MA Shuyi [7456 3219 2034]

ORG: Both of the Department of Biology

TITLE: "The Cell Structure and Ultrastructure of Liver Tissue in Freshwater Fish"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 93-99

TEXT OF ENGLISH ABSTRACT: The present paper is a report of our studies in the fine structure of the liver tissue in fish. The cellular structure of fish liver tissue is essentially like that of mammals. The lobules contain anastomosing plates of parenchymal cells and a labyrinthine system of blood sinusoids which radiate from the central vein to the periphery of the lobules.

In this paper we describe the fine structure of liver tissue of freshwater fish and discuss in detail its special structure.

AUTHOR: QIU Quanfa [8002 3123 4099]
LIU Zhensheng [0491 2182 5116]
LI Zaofa [2621 5679 4099]

ORG: All of the Department of Biology

TITLE: "A Preliminary Study on the Radiosensitivities of Rice Embryos"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 100-103

TEXT OF ENGLISH ABSTRACT: The function of uptake of tritiated thymidine (^{3}H-TdR) in rice embryos was studied by means of liquid scintillation counting. The results showed that gamma-rays had a definite effect on the uptake of ^{3}H-TdR in rice embryos. In the gamma-ray dosages ranging from 300 to 30,000 r, the rate of incorporation decreased with the increase of radiation dosage. It was assumed that the DNA damage of rice embryonic cells caused by gamma-rays decreased the synthesis of DNA, so the uptake of ^{3}H-TdR was reduced.

AUTHOR: WANG Yongrui [3769 3057 6904]
LI Zhuojie [2621 0587 2638]
LIN Qihan [2651 0796 3352]

ORG: All of the Department of Biology

TITLE: "A Preliminary Study on the Effect of Seed Treatment with Laser on the Ear Characteristic of Rice"

SOURCE: Guangzhou ZHONGSHAN DAXUE XUEBAO [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS SUNYATSENI], Natural Sciences Edition in Chinese No 3, Aug 80 pp 104-106

TEXT OF ENGLISH ABSTRACT: 1. The emergence of the ear on rice variety Chen-Chu-Ai can happen one to three days earlier by treating the rice seeds with a CO_2-laser, and the date of the heading stage of the rice plant can be delayed by one to two days by the same treatment with other lasers.
2. The percentage of full grains, the number of primary branches, secondary branches, grains per ear and 1000 grain weight are increased by the treatment with the N_2-laser, He-Ne-laser and Ar^+-laser, but treatment with the N_2-laser has no effect on increasing the number of full grains of the rice variety Zhai-Ye-Qing. The number of full grains per ear and 1000 grain weight can be increased, but the number of primary branches and secondary branches cannot be increased by treatment with the CO_2-laser.
3. The protein content in rough rice decreases slightly with the treatment of these

[Continuation of ZHONGSHAN DAXUE XUEBAO No 3, Aug 80 pp 104-106]

four lasers.

These results suggest that seed treatment with lasers could be a better avenue and/or model method in increasing the grain yield of rice.

9717
CSO: 4009

AUTHOR: YANG Xiao [2799 2556]

ORG: Lushou Glass Plant

TITLE: "Photoelectric Transform Circuit of Glass Bottle Counter"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 9, 25 Sep 80 pp 23-24

ABSTRACT: If a photoelectric transform circuit is used in glass bottle counter to obtain counting signals, due to the fact that the white translucent or semi-translucent glass bottle causes refraction or transmission when it is in the way of the light source, the range of variation of the photoelectric current of the phototube will be thus reduced and the transform wave form will become too complex for normal counting. The author and colleagues designed a phtoelectric counting circuit suitable for transparent substances. This paper introduces mainly the photoelectric transform portion of the counter circuit.

AUTHOR: CAI Renming [5591 0088 2494]

ORG: None

TITLE: "Major Properties of Some Plastic Cased Power Transistors for Television Receivers Made in China (Explanation for Inside Back Cover)"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 9, 25 Sep 80 pp 32, 31, inside back cover

ABSTRACT: In order to meet the needs of large quantity production of television sets, some silicon power triode products sealed in plastic cases have appeared. They are designed for the special use of television sets, and are small, light, and convenient to assemble. Among those listed in the table on the inside back cover of this issue, CS11, CS12, CS15, CS16, CS35, and CS36 are PNP; all the others are the NPN type. Applications of these Chinese made transistors are explained in the paper, while their properties are listed in the table on the inside back cover.

AUTHOR: LU Baofu [6424 1405 1381]

ORG: None

TITLE: "Surface Wave Filter and 'No Adjustment' Intermediate Frequency Amplification Circuit"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 10, 25 Oct 80 pp 1-2

ABSTRACT: Many intermediate frequency circuits with tuning loop are adopted in all Chinese made black and white television receivers. When a set is completely assembled, it must be repeatedly adjusted in order to obtain the required amplitude and frequency characteristics. This fact has caused inconvenience in the production process and is also the latent factor for trouble when the set is in operation. Following the extensive application of integrated circuits in television, it has become possible to use direct couple wide band applifier without adding tuning loop to satisfy the gain requirement. If a new component requiring no adjustment may be added to replace the original tuning loop, the intermediate frequency circuit may be made to need no adjustment. The acoustic surface wave filter is just such a new component. Its work theory and structure are described.

AUTHOR: CHANG Jiang [1603 3068]

ORG: Tianjin Television Station

TITLE: "Improving the Clarity of Beijing-840-1"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 10, 25 Oct 80 p 9

ABSTRACT: Beijing-840-1 is a transistor black and white television receiver with a relatively large screen. All its properties are relatively good except for the fact that its reception is not very clear. The author and colleagues made some changes to its intermediate frequency amplification circuit, its visual frequency amplification circuit, and the accessory circuit of its picture tube to cause the clarity to be greatly improved. These minor changes are described.

AUTHOR: HONG Yan [7703 7159]

ORG: None

TITLE: "Small High Fidelity Speakers"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 10, 25 Oct 80 pp 12-13

ABSTRACT: This paper introduces the YZX5-1 and YZX5-2 small high fidelity speakers. A photo of these speakers appears on the front cover of this issue of the journal. They are new products of Beijing Radio Plant, No 1. The 4-inch speaker YD110-1 made by the same plant is used as the bass unit. The size of the speaker box is rather small, suitable for the table or bookcase in the homes, but the sound is as good as any 8-inch speakers. The structure and property of these speakers are described.

AUTHOR: WANG Deyuan [3769 1795 3104]

ORG: None

TITLE: "Digital Device for Recording Coal and Water Imput of Biolers"

SOURCE: Beijing WUXIANDIAN [RADIO] in Chinese No 10, 25 Oct 80 pp 22-24

ABSTRACT: For the convenience of calculating bioler efficiency and saving coal, the author and colleagues designed and made an attachment for biolers to record numerically the amount of coal and water entering the boiler. The device is suitable for all industrial boilers. The basic work theory and the concrete circuits are given.

6168
CSO: 4009

AUTHOR: ZHANG Baoyou [1728 1405 2589]

ORG: None

TITLE: "Tanks of Tomorrow"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 10, Oct 80 pp 18-19

ABSTRACT: Tanks will continue to be a primary element in land warfare, and their capabilities will be improved. There is a trend to higher engine power, for example in the US HIMAG vehicle with a 1,500 HP engine and a possible 95 km/hr speed, and the West German VT1-1 and VT1-2, with horsepowers of 2,000 and 2,200 respectively. The suspensions of the XM-1 and Soviet T-80 tanks allow adjustment of hull height and attitude and provide a stable firing platform. Lighter weight is another way of increasing mobility, as in the case of the US HSTV-L, with a fighting weight of 14.5-17 tons. Composite armor, such as the British Chobham armor with inner layers of aluminum and ceramic, greatly improves survivability. Elimination of the turret, as in the Swedish S-tank, decreases height and profile, and lightens weight by about 10-20 percent. The German VT1-1 and the US HIMAG vehicles will have a semifixed gun, while the German Leopard 3 will use a movable gun. Larger-diameter rounds, new round types such as armor-piercing fin-stabilized discarding sabot rounds, use of depleted uranium penetrators, and fire control systems incorporating two-dimensional gun stabilizing, laser rangefinders, ballistic computers and infrared and low-light imaging, are improvements in the tank arsenal.

AUTHOR: LI Dajue [7812 2192 3635]

ORG: Botanical Garden, Institute of Botany, Chinese Academy of Sciences

TITLE: "The Safflower, an Oil Plant Which Protects Against Heart and Blood Vessel Disease"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 10, Oct 80 p 32

ABSTRACT: In 1976 the Beijing Botanical Garden, CAS, imported some United States and Mexican safflower varieties for experimental planting and study. Safflower seeds may contain 35-44 percent or more of oil, with a very high (72-80 percent) linoleic acid content, making it useful in protecting against heart disease. Industrial uses of safflower oil include paints and varnishes, in which it has good color stability, and alkyd resins. Seed cake makes a good animal feed. The flowers produce a dye, and the plant has a wide range of medicinal uses, including the treatment of coronary heart disease, in which it produces a rather rapid and steady effect and has almost no side effects, so that it can be used by individuals with high blood pressure. It should grow well in arid and semiarid areas of North China. In China, yields of up to 800 jin of seed and 80 jin of dried flowers per mu have been achieved.

AUTHOR: YANG Weichao [2799 0251 6389]

ORG: None

TITLE: "Health Effects of Electrical Pollution"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 10, Oct 80 p 38

ABSTRACT: Many animals avoid the vicinity of high-voltage transmission lines, and workers may become ill when working near them. Discharges produced by the lines produce ozone and nitrogen oxides, which may be injurious to health. In addition, high frequency alternating current can produce radio and television interference, and high-voltage electric fields can produce various neurological disorders, tachycardia, increased blood pressure and EKG and serum changes, increased reticulocyte counts and the like. Effective methods of protection include: use of stranded cables to increase conductive cross section, increased height of supports, and avoidance of passage of transmission lines throught populated areas; remote control of power line equipment, to relieve workers of the necessity of working too close to the lines; limitations on the time workers can spend in areas with strong electric fields, and provision of clothing with copper wire woven into it for protective purposes.

8480
CSO: 4009

AUTHOR: SUN Huizhong [1327 1920 0022]

ORG: None

TITLE: "Space Astronomical Observatory"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 11, 80 pp 6-7

ABSTRACT: This paper relates the history of astronomical observation from Galileo's telescope in the early 17th Century to today's astronomical satellites. Before the 60's, the astronomical observation wave bands were mainly the visible light, the infrared, the radio wave, and the microwave regions, while the observational tools were mainly optical and radio telescopes. By the 70's, more than 100 astronomical satellites had been launched by the various countries. With these space observatories, mankind is now capable of measuring the various forms of radiation of celestial bodies and the high energy particles of the universe. Important advancement has been made in high energy astronomical observation to reach regions of x-ray and gamma ray wave bands. Of the existing astronomical satellite the ANS of Holland is singled out for more detailed discussion in the paper.

AUTHOR: YU Zaiyang [0060 0961 3152]

ORG: None

TITLE: "Sweptfront Wing Aircraft"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 11, 80 p 18

ABSTRACT: A basic characteristic of the wings of birds is that they are generally sweptback during flight. This is the result of natural selection in millions of years of struggle for survival. The first problem to be resolved for early airplanes was lift; therefore, only straight wings were used. Later, when speed requirements were raised continuously, the sweptback wings were born. In 1948, they were first adopted for Mig 15 of the USSR and the F-86 of the USA, and they improved the speed of these aircrafts a great deal. Modern fighter planes also have wings of variable sweepback angles during flight to improve their high speed as well as low speed properties. They are called task-adaptable wings. The even stranger shape of aircraft wings is the sweptfront wings, which are now being studied by some aircraft companies in the USA. At present, certain companies have put this type of wings on the F-16 fighter planes to carry out large scale wind-tunnel tests. Sweptfront wings were tested by Germany toward the end of WWII, but there were many technical problems. It is only due to the advancement of electronic computers and the availability of strong and light weight materials of today that some of these problems may be resolved. It is the prediction that in the middle and late 90's the sky will be full of aircrafts with all sorts of strange shaped wings.

AUTHOR: BAO Yunqiao [7637 0061 2881]

ORG: None

TITLE: "What are the Secrets Revealed in the 'Hydrogen Bomb Leak Case'?"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 11, 80 pp 11-12

ABSTRACT: In March 1979, the courts of the USA issued 2 injunctions to stop the publication of an article titled the SECRET OF HYDROGEN BOMB by a California newspaper. Later, it was discovered that the source materials used by the author were all available to the public in the Los Alamos library, among the documents released by the USA government from 1971 to 1976. Under the pressure of public opinion, the courts were forced to rescind the injunction orders. Although, it appears that the article does not in fact reveal any secret information, it does allow the general public of the world to learn something about modern strategic and tactical nuclear weapons. This paper reports briefly the so-called hydrogen bomb secrets revealed in that article. There is also a brief discussion of ways of miniaturizing nuclear weapons and the various new tactical nuclear weapons, including the proton bombs of the USSR and neutron bombs of the USA.

AUTHOR: WANG Changyan [3769 7022 3508]
QU Jucheng [2575 5112 2052]

ORG: None

TITLE: "Strategic Warning"

SOURCE: Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 11, 80 pp 36-38

ABSTRACT: Based upon a general idea of the strategic warning system and the missile defense system of the USA, the paper gives a general and haphazard explanation of the importance of strategic warning, the modernized strategic warning network, warning and anti-warning techniques, ultra long distance radar, electromagnetic wave barrier, etc.

6168
CSO: 4009

AUTHOR: ZHANG Xhiji [1728 0013 4614]
YANG Anlu [2799 1344 4389]
CHEN Guangyu [7115 0342 439B]
et al.

ORG: All of Chengdu Institute of Radio Engineering

TITLE: "An Automated Frequency Measuring System Implemented with the IEC-IB"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 1-17

TEXT OF ENGLISH ABSTRACT: This paper describes an automated frequency measuring system. The system consists of a 300 MHz frequency counter with a 9-digit display, a paper strip printer with 12 columns and a hard-wired logic controller, all implemented with the IEC-IB (equivalent to the American IEEE Std 488 or HP-IB). The devices and components in the system are solely made in China. This demonstrates that it is possible to develop instrumentation and ATS with IEC-IB in China.

AUTHOR: CAI Minxue [5591 2404 1331]

ORG: Qinghua University

TITLE: "A Pneumatic Bridge in Adverse Circumstances"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 18-23

TEXT OF ENGLISH ABSTRACT: This article introduces a pneumatic bridge in adverse circumstances. The bridge may retain its equilibrium with variating supply, and is free from block up while the measuring object is in a dusty environment and the supply is in a negative pressure. The variating supply cannot affect the equilibrium of the pneumatic bridge while the ratios of the exponents of the bridge-arms are equal. In addition, an alternating bias pneumatic bridge is designed to avoid block up.

AUTHOR: GUO Shuxing [6753 2885 5281]

ORG: Beijing Third Radio Equipment Factory

TITLE: "High Frequency Parameter Measurement of Fixed Condenser"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 24-33

TEXT OF ENGLISH ABSTRACT: This paper describes the measurements of several high frequency parameters of the fixed condenser by a resonance method with the aid of a wide frequency band Q meter. It includes the separate detective analyses of the equivalent serial and paralleled resistances, the serial inductance and high frequency dissipation (within 300 MHz). This paper also analyzes the measuring accuracy quantitatively.

AUTHOR: LIN Yingrong [2651 2019 2837]

ORG: Jinan University

TITLE: "An Optical Compensation Modulation of Effective Signal in the Absorption Spectrometry"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 34-38

TEXT OF ENGLISH ABSTRACT: This paper introduces the principle of an optical compensation modulation of an effective signal in atomic absorption spectrometry. The theoretic discussion and analogue experimental datum proved that it can eliminate the effect of a negative signal on the Beer-Lambert law, and enhance the measuring sensibility.

AUTHOR: XI Hongxiang [1153 7703 6116]

ORG: China Scientific Research Center of Shipbuilding

TITLE: "The Laser Velocimetry of Fluid Field in Hydrodynamics"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 39-44

TEXT OF ENGLISH ABSTRACT: This paper presents the mechanical scanning method of digital control of the fluid field in hydrodynamics. According to the method, a "Laser Velocimetry Automatic Scanning Machine" is designed. Its principle, construction and experimental results are given. It shows that the accuracy, efficiency and experimental results of the meter are satisfactory.

AUTHOR: FAN Dajun [2868 1129 6874]

ORG: Beijing Institute of Technology

TITLE: "Theoretical Analysis for Bellows Welded by Ring Shells"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 45-56

TEXT OF ENGLISH ABSTRACT: Each diaphragm of bellows is a ring shell. R/a of the shell is in the range of 0.8 to 1.2. Therefore, we cannot use the general solutions of the slender ring theory. In this paper, according to A. I. Lur'ye's equation of axial symmetrical loaded shell of revolution, the equations of the ring shell theory within the range of $0.8 \leq R/a \leq 1.2$ are derived. V. V. Novzhilov's equation is a specified case of the equations derived. The solutions of the equations derived in this paper are the theoretical bases for designing the welded bellows.

AUTHOR: FU Zhichao [1381 5268 6389]

ORG: Harbin Research Institute for Electromagnetic Measuring Instrumentation

TITLE: "Integral Error of an Integrating Type A-D Converter and Its Optimum Arrangement of Integration"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 57-63

TEXT OF ENGLISH ABSTRACT: In an integrating type A-D converter, the relation between integral error and integral value of output voltage from the integrator within one work period has been verified. This paper presents that "the independence of the average output voltage from the integrator to the measured voltage and the approach of this average output voltage to zero level" can be used as an intuitive estimation of integral error of the converter, and it can be used as a criterion for assessing the principle scheme of the converter in considering whether it is reasonable. The principle shortcomings of some common types of converters are pointed out.

The relation between the arrangement of integration and the integral error has been analyzed. Theoretically, the optimum arrangement of integration is to arrange the integration in a time sequence according to the symmetrical principle. This arrangement can reduce the integral error to a great extent, and it is a new approach in developing high accuracy integrating type digital voltmeters.

AUTHOR: SHI Lixiu [0670 0632 0208]
OU Jincai [2962 6930 2088]

ORG: Both of Xi'an Instrument Factory

TITLE: "An Approach to the Experimental Design of Corrugated Diaphragms"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 64-70

TEXT OF ENGLISH ABSTRACT: This paper states the experimental design of the adjustable forming die adopted to use in the design of corrugated diaphragms. Cited in this paper are the theoretical basis of this design method, chief means and fundamental procedures. Some examples are also cited in the illustrations of this paper.

AUTHOR: WANG Guangsheng [3769 1684 3932]
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ORG: Both of Beijing Polytechnic University

TITLE: "An Investigation on the Modification of Temperature Drift in the IC Operational Amplifier"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 71-82

TEXT OF ENGLISH ABSTRACT: This paper analyzes the factors that affect the input offset voltage V_{os} and temperature drift $\frac{\partial V_{os}}{\partial t}$ in the IC operational amplifier. It introduces a method to reduce V_{os} and $\frac{\partial V_{os}}{\partial t}$. The collector resistance and current in the next voltage of the preamplifier should be adjusted carefully, and a low-drift point corresponding to the zero offset voltage may be obtained. In the temperature range of $0 \sim 60^{\circ}C$, V_{os} and $\frac{\partial V_{os}}{\partial t}$ will be less than 10 nV and $0.5V/^{\circ}C$ respectively.

AUTHOR: XU Xilin [1776 6932 2651]

ORG: Shanghai Jiaotong University

TITLE: "On the Determination of Bearing Rigidity in Dynamic Balancing Machine Design for Large High Speed Rotors"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 83-90

TEXT OF ENGLISH ABSTRACT: The reasonable selection of bearing rigidity of the pedestal is the crux in designing the dynamic balancing machine for large high speed rotors. This paper reveals the effect of bearing rigidity of the pedestal on the mode of vibration of flexible rotors and the rule of variation with the aid of theoretical analysis and experimental research. This paper offers the theoretical basis for designing the bearing rigidity of the pedestal of the dynamic balancing machine for large high speed rotors.

AUTHOR: HE Zhenjiang [0149 2182 3068]

ORG: Chongqing University

TITLE: "Photoelectric Sensor for Surface Flaw Detection"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 91-98

TEXT OF ENGLISH ABSTRACT: This paper describes the features, principle and sorting method of the photoelectric sensor for surface flaw detection. The computing method of the sensor sensitivity, signal-to-noise, are described. The number of D and K for 1 micron resolving power is computed. An optical method for classifying defects and the gists of design and the method of evaluating function on the sensor are also presented.

AUTHOR: SUN Zhiwei [1327 4363 0251]
LI Wei [2621 0251]
SUN Tongkun [1327 0681 0981]
SUN Chuanxiang [1327 0278 7449]

ORG: All of the Institute of Mechanics, Chinese Academy of Sciences

TITLE: "A Water-Cooled Integrating Sphere Laser Power Meter"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 99-103

TEXT OF ENGLISH ABSTRACT: A water-cooled integrating sphere laser power meter, using metallic rough surface for its diffusely reflecting surface, has been described in this paper. The power meter is calibrated by a reference energy meter and has the following special advantages: fast response (10^{-1} sec), better reproducibility ($< 1\%$) and wide measuring range (from 1 to 10^3 W). The resulting difference between the meter and national standard high power meter in measuring the same laser output is within 1%.

AUTHOR: YANG Yemin [2799 2814 2404]
JIN Hui [6855 6540]

ORG: Both of the Institute of Mechanics, Chinese Academy of Sciences

TITLE: "The Development, Manufacture and Application of the Digital Controlled Flash X-Ray Synchronizer"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 104-109

TEXT OF ENGLISH ABSTRACT: This paper introduces a new synchronizer which can control several flash X-ray devices. It possesses high quality anti-interference, high accuracy and is convenient to operate. This paper discusses the method of anti-interference and how to insure the accuracy in operation. It also gives the breakdown process of a detonator and the developing process of a shaped charge jet in X-ray photographs.

AUTHOR: LU Xigan [4151 1585 2413]

ORG: Shenyang Institute of Instrument Techniques

TITLE: "On the Relation between Power Source Rejection Ratio, Open Loop Voltage Gain and Common Mode Rejection Ratio of an Operational Amplifier"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese Vol 1 No 4, Nov 80 pp 110-115

TEXT OF ENGLISH ABSTRACT: Based on the principle of relativity of electric potential, this paper induces a formula that indicates the relation between D.C. small signal power source rejection ratio, open loop voltage gain and common mode rejection ratio of an operational amplifier.

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CSO: 4009

AUTHOR: WEI Junquan [7614 0193 0356]

ORG: None

TITLE: "Test Drilling of 50m Deep Holes With Plasma Flame Current"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGOUND ENGINEERING] in Chinese No 8, Aug 80 pp 1-5

ABSTRACT: This paper reports the use of plasma flame current to drill vertical holes, 50m in depth. A total of 12 holes were drilled. The deviation was generally 2-4m. As the depth of the hole increases, the deviation is found to become greater. Under normal conditions, plasma flame is found to be 3-4 times faster than mechanical drills at a cost only 50 percent of that of mechanical drills for drilling through hard rocks. During operation, there is only the harmful gas of N_2O_5, unlike compressed air (diesel) flame drills which produce harmful gas as well as combustible gas. The technique of plasma flame drilling, the structure and parameters of air plasma gun, and the structure of the advancing device used in the experiment are described.

AUTHOR: CAO Xiaozhen [2580 1321 2182]

ORG: None

TITLE: "Noise Attenuation Design for Undergound Construction Engineering"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGOUND ENGINEERING] in Chinese No 8, Aug 80 pp 6-11

ABSTRACT: Frequencies of noises of shops of various types, such as boilers, diesel generators, water pumps, air compressors, die-casting, vibration polishing, etc. are analyzed in search of various ways of muffling these noises of underground plants. Toward the end of the paper, measures of adding ventilation pipes and installing acoustic insulating materials such as glass wool and perforated boards etc. are described, as well as the noise reduction effects when these measures are applied to improve the condition of an unnamed underground factory.

AUTHOR: LI Huomu [2621 0129 4476]

ORG: None

TITLE: "Dehumidification of Underground Structures"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 8, Aug 80 pp 12-14

ABSTRACT: Currently, the problem of large quantities of moist air or the phenomenon of condensation exist in all underground structures that have been completed and put to use. The condition of high humidity directly affects the quality of the structure. Materials stored in underground warehouses will rot and machines will become corroded. It is generally believed that this condition is the result of improper drainage, but the drainage of many of these caves is relatively satisfactory but there is still problem of condensation whenever a slight dampness occurs. The author analyzes the causes to be the fact that too much water was used to mix the concrete during construction, hot and moist air were allowed to seep into the cave, moisture brought into the cave by workers and materials, and humidity of the water used and drained in the underground structure. Dehumidification measures discussed in the paper include natural ventilation, applying calcium chloride, mechanical dehumidification, sealing doors and other entrances to the cave, and installing curtains and other insulating materials.

AUTHOR: ZHANG Yongquan [1728 3941 2164]

ORG: None

TITLE: "Natural Ventilation of Underground Structures"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 8, Aug 80 pp 19-29

ABSTRACT: With the rapidly increasing number of underground structures in China, natural ventilation has been increasingly favored by many due to the advantages of economy, freedom from noise, and natural dehumidification during winter months. Natural ventilation depends upon wind power and the temperature differential inside and outside of the structure, however. It is, therefore, difficult to determine the average weather condition for the calculation of the various parameters to obtain effective natural ventilation. This paper discusses the various problems in designing natural ventilation of underground structures and various ways of calculating wind speed, air pressure, structural resistance, etc.

AUTHOR: LI Shizhong [2621 0013 1813]

ORG: None

TITLE: "Application of Sound-wall Blasting and Shotcreting Technology in China's Engineering"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGOUND ENGINEERING] in Chinese No 10, 11 Oct 80 pp 1-7

ABSTRACT: Due to the coordinated application of sound-wall blasting and shotcreting in recent years, success has been achieved even under the condition of unfavorable geology and large sized rock-chamber. This paper reports applications of these 2 techniques in coal mine transportation tunnels, railway tunnels, dry-docks, aqueducts of hydroelectric power stations, etc. Methods for calculating the design parameters of these techniques, outstanding problems, and trends of future development are discussed.

AUTHOR: YAN Ronggui [7346 2837 6311]

ORG: None

TITLE: "Elastic Wave Speed and Measurement of Three Dimensional Stress of Rock Body"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGOUND ENGINEERING] in Chinese No 10, 11 Oct 80 pp 8-13

ABSTRACT: The elastic wave technique is being tried here and abroad to determine the three dimensional stress of rock bodies to replace stress release. This paper discusses the technique by explaining the relationship between elastic wave speed and elasticity constant of the medium, between elastic wave speed and variation of the state of stress, and some foreign and domestic experimental data concerning elastic wave speed stress state.

AUTHOR: LI Xirun [2621 6932 3387]
LIN Yunmei [2651 7301 2734]

ORG: None

TITLE: "An Inquiry Into the Mechanism of Anchor Rod Action"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGOUND ENGINEERING] in Chinese No 10, 11 Oct 80 pp 19-27

ABSTRACT: For the purpose of clarifying the designing principle of anchor rods, this paper investigates the effects of this form of support medium and the stress state of the surrounding rocks under the action of anchor rods. Under the condition of unfavorable geology, the support action of bolting depends entirely upon the prestress P of the anchor rod. In order to guarantee the long term safety of the tunnel, therefore, attention must be given to stress slacking of the anchor rods. This paper deals largely with horizontal problems, while the stress produced by the anchor rods in the surrounding rocks is a problem of three dimensional space. The values obtained by the equations discussed in the paper are, therefore, definitely too high for practical applications.

AUTHOR: LIU Yutang [0491 3768 1016]

ORG: None

TITLE: "Types of Anchor Rods"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGOUND ENGINEERING] in Chinese No 10, 11 Oct 80 pp 28-35

ABSTRACT: According to related reports, there are about 600 types of anchor rods and there are many ways of classifying them. First they are divided into those that have no prestress and those that have different sizes of prestress. Some classify anchor rods according to the material of which the rod is made. There are, therefore, metal rods, wood rods, glass fiber rods, plastic rods, and mixed rods. When anchor rods are divided according to the manner of fixing it in the hole, there are the mechanical, the blast, the cement bound, and the polymer glued, etc. According to anchor stabilizing theory, there are the impact type, the swelling casing type, the enclosed type, the screw thread type, and the solid body type. Guided by both domestic and foreign materials on the subject matter, this paper collects and describes anchor rods according to the theory of their stabilizing action.

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CSO: 4009

END